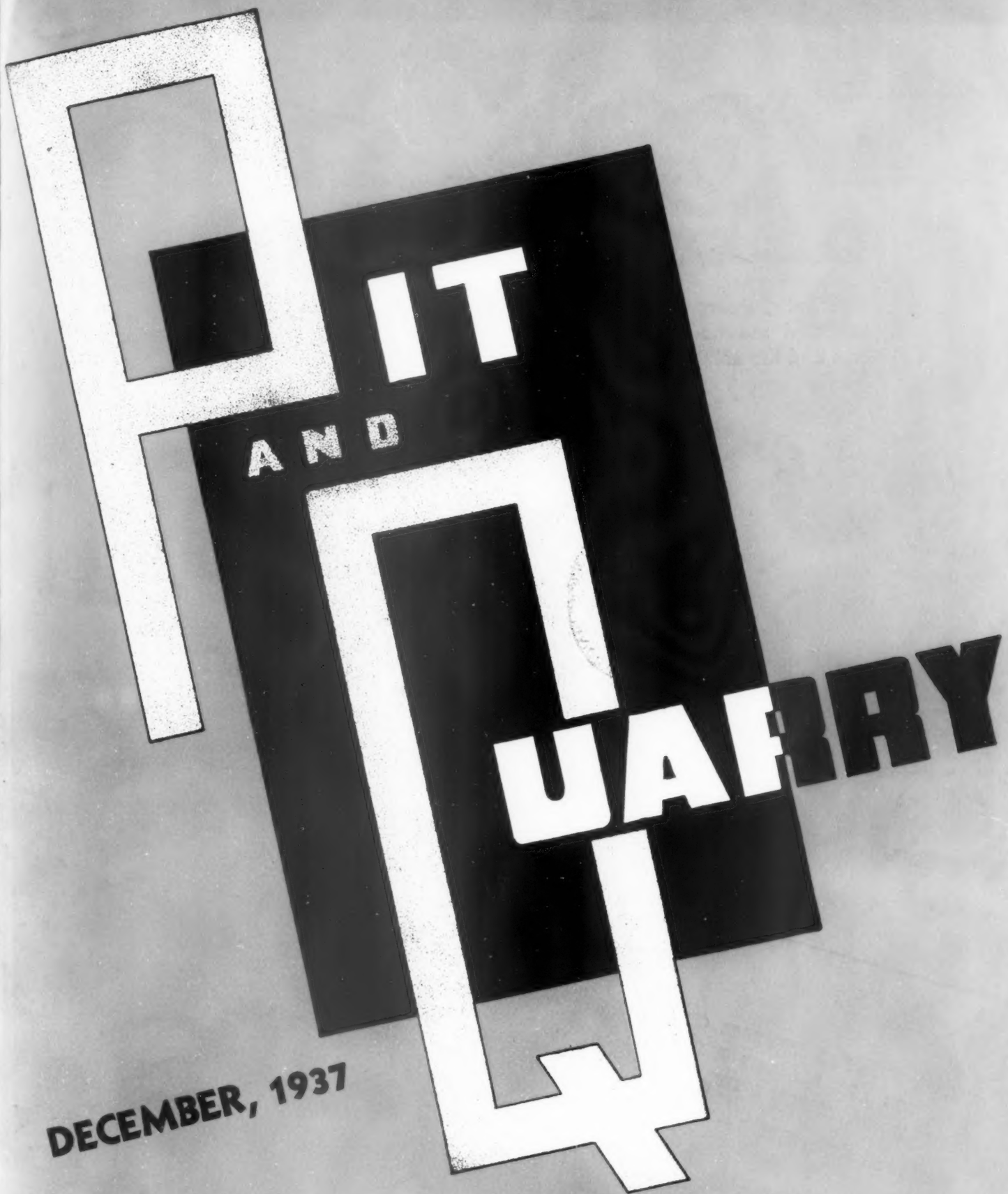


DECEMBER, 1937

Missouri Portland Cement's New Laboratory . . . Feldspar Firm Expands . . . Indiana's Newest Mineral-Wool Plant . . . The Residential-Building Conference . . . Legal Aspects of Silicosis

PATTERSON

Specializes in Very Fine Grinding

When the discussion deals with particle sizes in terms of microns—PATTERSON is your best bet.

Where extremely difficult grinding problems are to be solved, Patterson starts where others leave off. The Patterson Research Department, equipped with both laboratory and pilot plant equipment, photomicrographic apparatus, and manned by physicists and chemical and mechanical engineers, can find the solution—and you are under no obligation.

SATISFACTORY PATTERSON MACHINERY

TOUGH PROBLEMS AND EASY GRINDING JOBS ARE ALL ONE AND THE SAME TO PATTERSON ENGINEERS.

WRITE US—OR BETTER—VISIT US.

Rugged—True Running Efficient . . .

There is a Patterson Mill ideally suited to your service—whatever your requirements may be.

Richard L. Cameron
PRESIDENT

THE PATTERSON FOUNDRY and MACHINE CO.

EAST LIVERPOOL, OHIO, U. S. A.

During the Winter— Prepare for Spring

New Link-Belt sand and gravel plant of Bellamy Sand & Gravel Company, Correctionville, Iowa. Capacity 100 tons per hour of gravel and the same amount of sand. This plant is equipped with reciprocating feeder, anti-friction belt conveyor with self-aligning troughing idlers, shaking picking table for more efficient hand picking of shale and soft stone, heavy duty scrubber for cleaning ¾ inch gravel, and Shaw classifiers for accurate sand classification.

● Plan for lower operating costs and a better product when your plant opens up next spring, by making replacements and additions to your equipment now.

To take fullest advantage of the greater opportunities which should come from Government and other work, you must be able to meet rigid specifications.

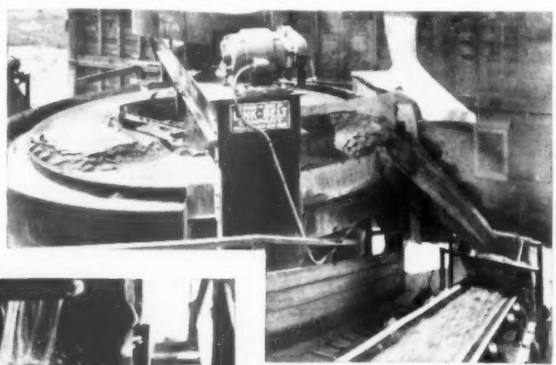
A few suggestions for profitable modernization are illustrated. There are others. Send for Book No. 1240.

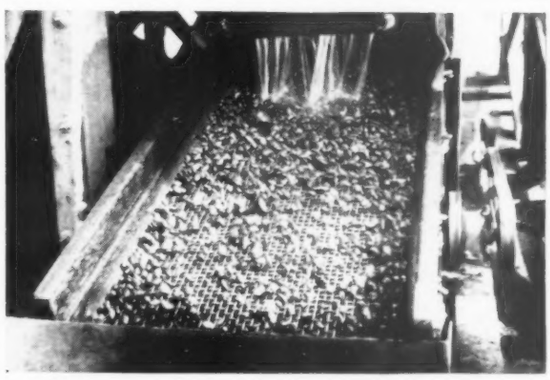
Address Link-Belt Company, Chicago, Philadelphia, Indianapolis, Atlanta, San Francisco, Toronto, or any of our other offices located in principal cities.

7241

SAND RECOVERY

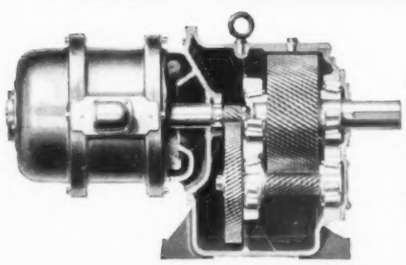
The Rotoscoop is a perfected sand dewatering unit which is capable of recovering fine grains and discharging dry enough for truck transportation. Send for Folder No. 1463.





SCREENING

Supplement your rotary screens with Link-Belt vibrating screens to obtain a better grading of the smaller sizes of gravel or stone. Rotary screens for better washing—vibrating screens for better sizing. The combination of both rotary and vibrating screens assures your ability to meet the most rigid specifications.



REPLACE OPEN GEAR DRIVES

Greater efficiency as well as safety can be obtained by using Link-Belt speed reducers. The Link-Belt line includes herringbone gear, worm gear and motorized helical gear reducers as well as variable speed transmissions, silent chain and roller chain drives.

BELT CONVEYORS

Replace your old, plain-bearing belt conveyor idlers with modern Link-Belt anti-friction bearing idlers. Save power, assure dependability and cut down maintenance costs. The conveyor illustrated is equipped with the Link-Belt positive self-aligning idler which automatically and positively maintains the troughed conveyor belt central at all times.

LINK-BELT

Equipment for Handling Sand, Gravel, Stone

PIT AND QUARRY, December, 1937. Vol. 30, No. 6. Published monthly by the Complete Service Publishing Company, 538 South Clark Street, Chicago, Ill. Subscription price $1 for 1 year in the U. S. and possessions, Canada and Central and South America; elsewhere $1 additional for each year. Single copies 20 cents. Entered as second-class matter November 28, 1932, at the Post-Office at Chicago, Ill., under the Act of March 3, 1897. Additional entry at Milwaukee, Wis.

EASY HOOKUP

Connect Up with

PROFITS Cordeau-Bickford, the insensitive detonating fuse, acts as the detonator in the hole and the hookup for *all* holes. It assures maximum power from every cartridge and more effective results from every shot. Larger blasts are made feasible, better fragmentation is secured, and much less time is lost in moving equipment back and forth. Time saved on loading the holes and on other operations means extra profits for you.

Write for a copy of the Cordeau Book, available without charge.

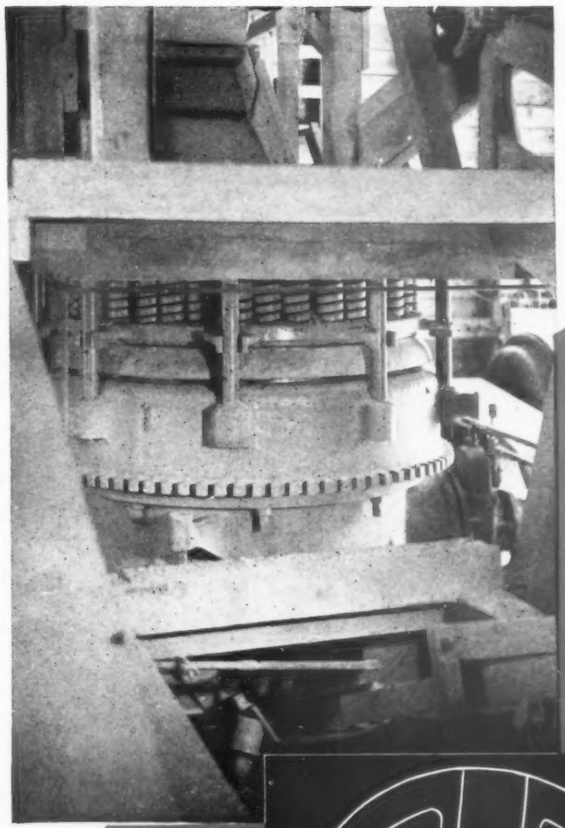
MAKERS OF ENSIGN-BICKFORD SAFETY FUSE SINCE 1836

CB67

CORDEAU BICKFORD Detonating Fuse

THE ENSIGN-BICKFORD COMPANY

Simsbury, Conn.

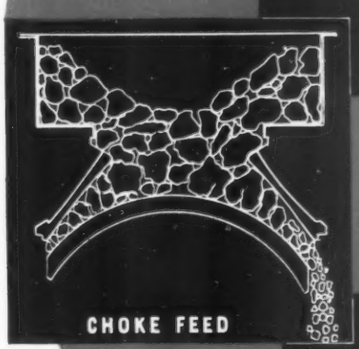


This 48 in. Telsmith Gyrasphere Crusher crushes ore to minus ⅜ in. in the custom mill of the Cripple Creek Mining and Milling Co., Cripple Creek, Colorado.

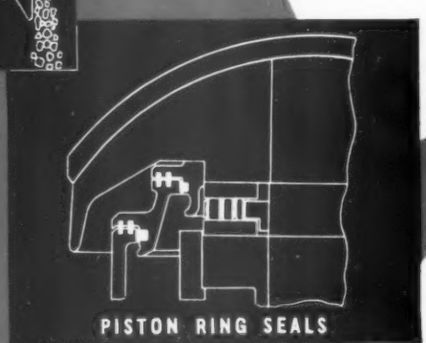
The Only SECONDARY CRUSHER WITH THE Double Wedge CRUSHING ACTION

Working at choke feed, the Telsmith Gyrasphere Crusher not only turns out an enormous tonnage of more cubical aggregate, but crushes finer, with less trouble, less power, and less upkeep.

In the Gyrasphere, *two forces cooperate to produce the most effective breaking action ever developed in any crushing device.* The head is impelled both by the gyrated shaft and a rotary wedge action, produced by the supporting eccentric and roller thrust bearing. The bronze eccentric sleeves are relieved of most of the load—pressures being diverted downward to the massive roller thrust bearings which wear evenly and last indefinitely.



The Gyrasphere takes an unregulated and unlimited choke feed. That means steady, reliable, economical, effective reduction capacity.



Double protectors . . . four flexible leather labyrinth seals plus two piston rings . . . reduce both oil consumption and maintenance expense to a minimum never attained in any other crusher.

Write for Bulletin Y-15

SMITH ENGINEERING WORKS
504 E. CAPITOL DRIVE MILWAUKEE, WIS.

50 Church Street, New York City
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YC-11

TELSMITH GYRASPHERE

We lubricate EACH WIRE
TO INSURE LONG LIFE

AMERICAN TIGER BRAND WIRE ROPE

American Tiger Brand Wire Rope
Electrical Wires & Cables
Amerclad All-Rubber Cables
Aerial Tramways
Tiger Wire Rope Slings
Tiger Wire Rope Clips

LUBRICATION at each point of contact in wire rope is of equal importance to that in any complicated machines*. It reduces external wear, prevents corrosion, cuts down internal friction and enables each strand to move freely — all of which results in increased useful life.

Every wire of American Tiger Brand Wire Rope is carefully lubricated. This adds vitally to the flexibility of the rope, enabling it to withstand the terrific jerks of starting and stopping.

This lubrication is the result of years of engineering and field experience and is but one of the many different features which make American Tiger Brand Wire Rope a profitable operating investment for you.

American Tiger Brand Wire Rope is available in either Standard (non-preformed) or Excellay (preformed) constructions.

*** Machines? Absolutely, wire rope is a machine. It fits perfectly the dictionary definition, "Any combination of mechanism for utilizing or applying power."**

AMERICAN STEEL & WIRE COMPANY
Cleveland, Chicago and New York

COLUMBIA STEEL COMPANY
Russ Building, San Francisco

United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

IT TOOK 400,000 TONS FOR A RIDE

AWAY back in March 1928 a large Pennsylvania stone company called in the G. T. M. — Goodyear Technical Man — and asked him to specify a belt for a new elevator being installed in their quarry. On his recommendation a Goodyear Style RC Elevator Belt, with an 8-ply carcass of heavy closely-woven 35 ounce silver duck, was installed.

This belt was fitted with one hundred twenty buckets, each weighing 70 pounds, each having a capacity of 150 pounds of stone ranging from fines to 6" size, putting a total load of over eight tons on this belt while in use. Operating approximately 60% of the time each year it elevated over 400,000 tons of stone before being replaced last March—*after giving nine years of trouble-free service!*

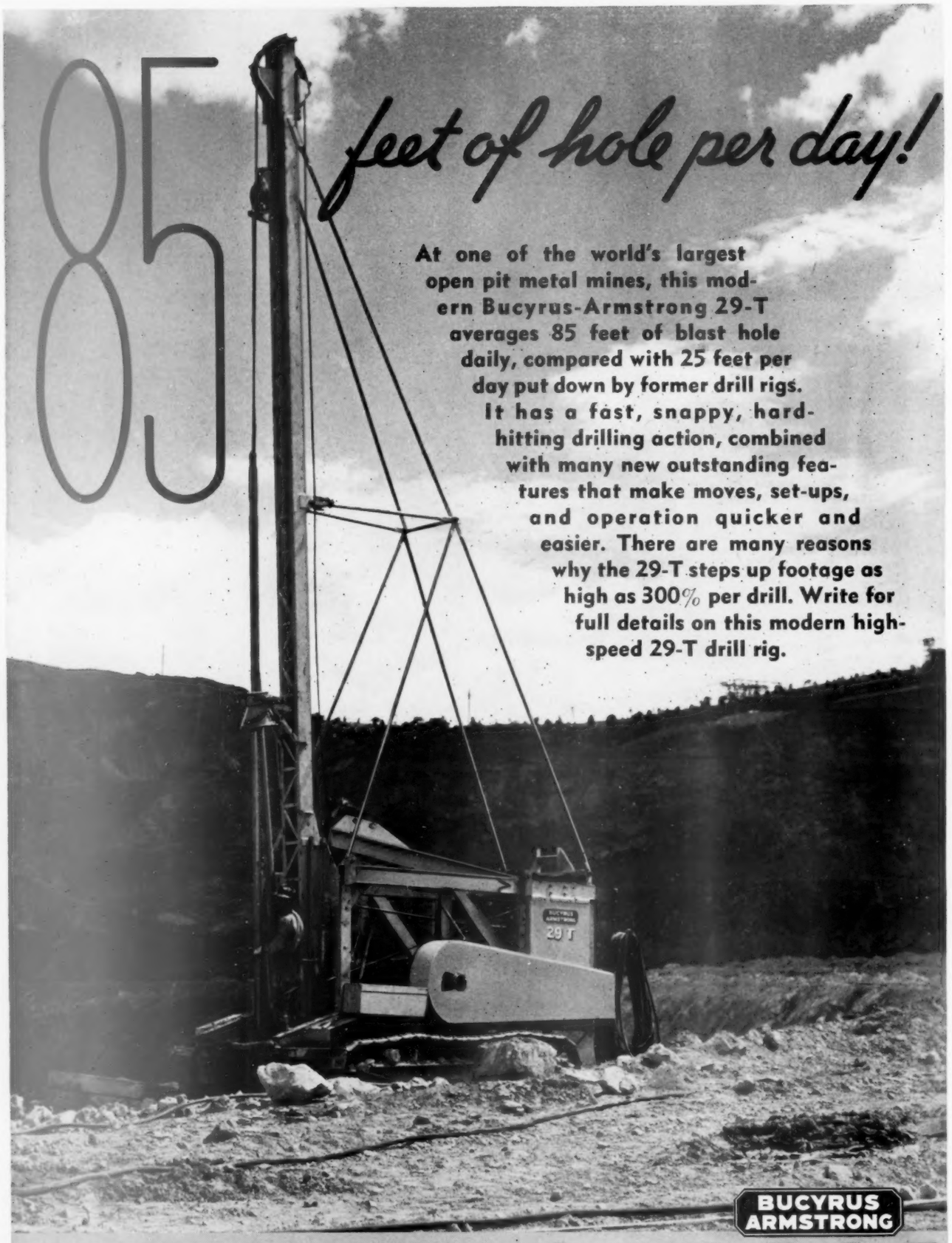
Let the GTM help you

In any operation requiring conveyor or elevator belting, G. T. M.-specification assures the same long, low-cost service. Goodyear heavy duty elevator belts are built with a skim coat between each ply to reduce the possibility of separation and minimize penetration of moisture at the bolt holes. The extra heavy carcass resists any tendency of the bolt heads to pull through and the tough rubber cover is specially compounded to withstand severest abrasion—which explains their exceptionally long life.

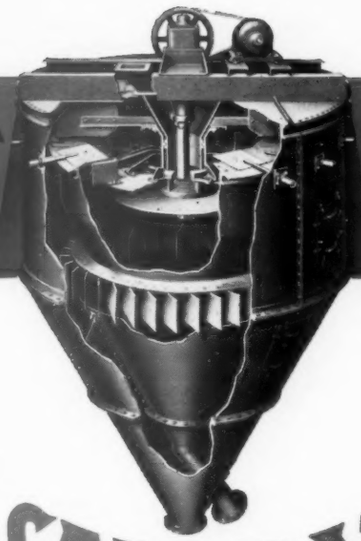
If you have never consulted the G.T.M. it will pay you to make his acquaintance. You will find him a friendly adviser whose long experience meeting all types of quarrying problems may benefit you. To bring him to your plant, write Goodyear, Akron, Ohio, or Los Angeles, California — or the nearest Goodyear Mechanical Rubber Goods Distributor.

THE GREATEST NAME IN RUBBER

GOODYEAR


85
feet of hole per day!
At one of the world's largest open pit metal mines, this modern Bucyrus-Armstrong 29-T averages 85 feet of blast hole daily, compared with 25 feet per day put down by former drill rigs. It has a fast, snappy, hard-hitting drilling action, combined with many new outstanding features that make moves, set-ups, and operation quicker and easier. There are many reasons why the 29-T steps up footage as high as 300% per drill. Write for full details on this modern high-speed 29-T drill rig.
29 T
BUCYRUS ARMSTRONG
BUCYRUS-ERIE
DRILLING, EXCAVATING, AND MATERIAL-HANDLING EQUIPMENT.. SOUTH MILWAUKEE, WISCONSIN

STURTEVANT



AIR SEPARATORS

220 SEPARATORS

78 PLANTS

IN THE

CEMENT INDUSTRY

A remarkable record; obtained only because of the proven facts that they

CONTROL PARTICLE SIZE

CONTROL SURFACE AREA

INCREASE MILL CAPACITY

LOWER TEMPERATURES

LOWER PRODUCTION COSTS

Mr. Cement Manufacturer.

Dear Sir:

This record is not the result of chance or accident but because of superior results made possible by improved design and application.

Knowledge based upon research and the practical experience of these many installations has taught us how to design a machine adapted to these special requirements.

With this perfected Separator we improve the process from Kilns to Silos. There is one best method and we have made it our business to find that method. It resolves itself into an engineering problem in separator design, placement and application. These are the plus values, obtained without cost to purchasers of Sturtevants.

STURTEVANT MILL CO. HARRISON SQUARE **BOSTON, MASS.**

Wire Rope and Strand

now products of Bethlehem

WITH the recently-announced acquisition of Williamsport Wire Rope Company by Bethlehem Steel Company, Bethlehem becomes a manufacturer of wire rope and strand.

For years the name Williamsport has been identified with dependable wire rope and strand. Not only to men who have been using Williamsport products, but to all other wire rope and strand users, Bethlehem's entry into this field marks an important forward step.

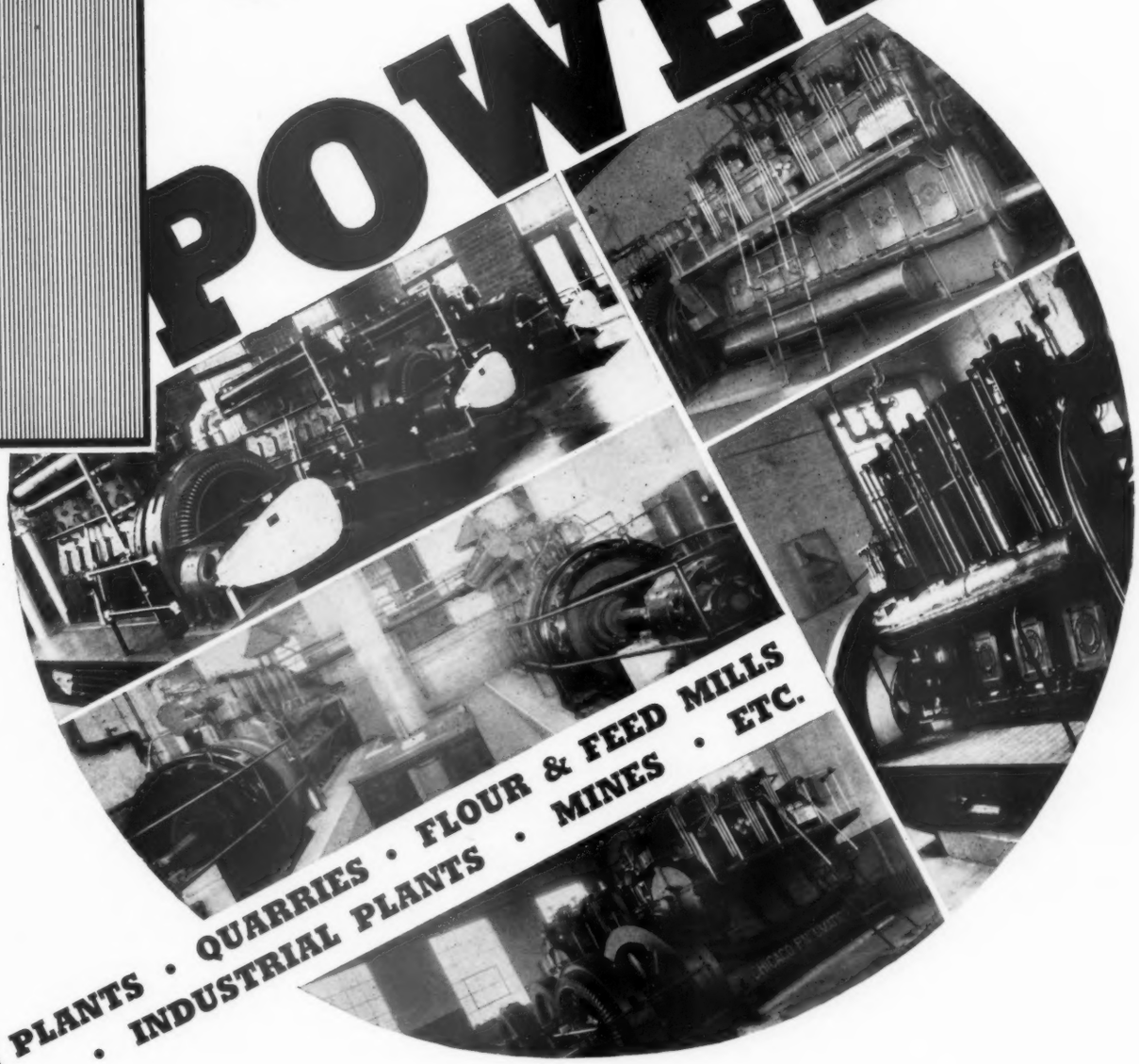
As Williamsport Wire Rope becomes Bethlehem Wire Rope, customers of Williamsport Wire Rope Company can look with assurance to Bethlehem to maintain the quality standards associated with Williamsport products. Advantages to the user may naturally be expected to accrue from the broader manufacturing and servicing facilities offered by the Bethlehem organization.

Customers of Bethlehem Steel Company can now obtain a complete line of wire rope and strand from the same source which furnishes their other steel requirements, and made to the same quality standards as those that govern in the manufacture of Bethlehem alloy and tool steels, plates, sheets, and other products.

Wherever and however you use wire rope and strand you will find Bethlehem a source of well-made, dependable material, serviced by men whose long, first-hand experience in analyzing and solving wire-rope problems is a background for authoritative recommendations on the most suitable grade of Bethlehem Wire Rope for any task.

BETHLEHEM STEEL COMPANY

1¢ ...OR LESS PER K.W.H. POWER



In plants such as these, and in hundreds of others, CP Diesels are consistently producing dependable power for ONE CENT per K.W.H.—or less!

Let our experienced engineers study your power needs and prove the economy of CP Diesels. Your request for a survey involves no obligation.

CHICAGO PNEUMATIC TOOL COMPANY
ENGINE MANUFACTURERS FOR MORE THAN 30 YEARS

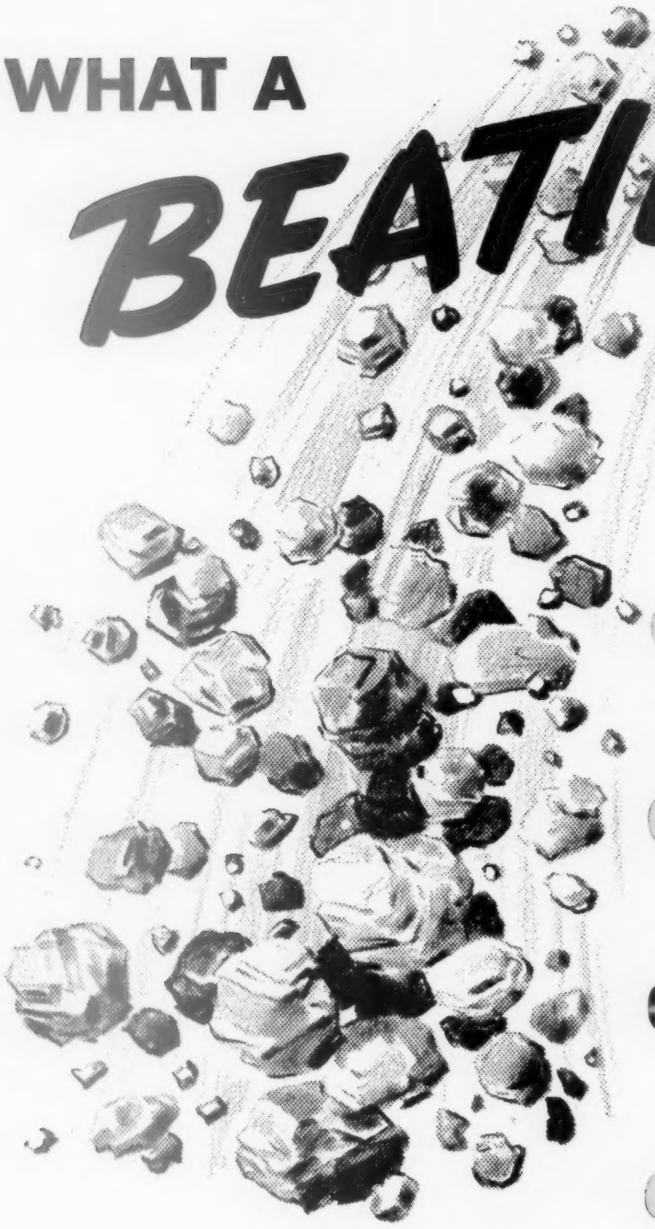
6 EAST 44th STREET
NEW YORK • N. Y.

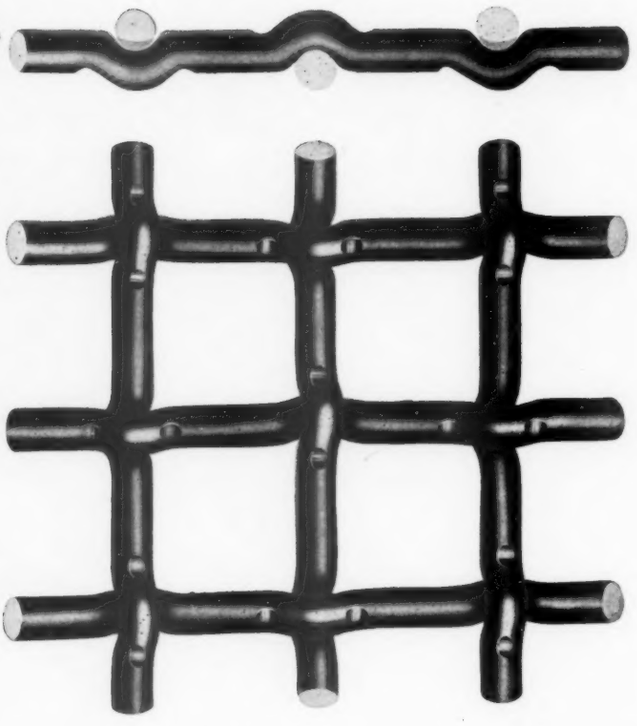
CHICAGO PNEUMATIC DIESELS

M-1-36

WHAT A BEATING!

HOW LONG DOES YOUR SCREENING STAND IT?





ABRASIVE TORRENTS of stone and gravel... constant vibration. Only screening with a maximum of toughness and stamina built into the wire itself can take this beating and give maximum life.

Making wire to withstand tough service conditions has been Roebling's business for over 90 years. If your screening problem is resistance to vibration and abrasion, let us put this long experience to work for you.

Roebling Wire Screening is made for every sizing, cleaning and grading service.

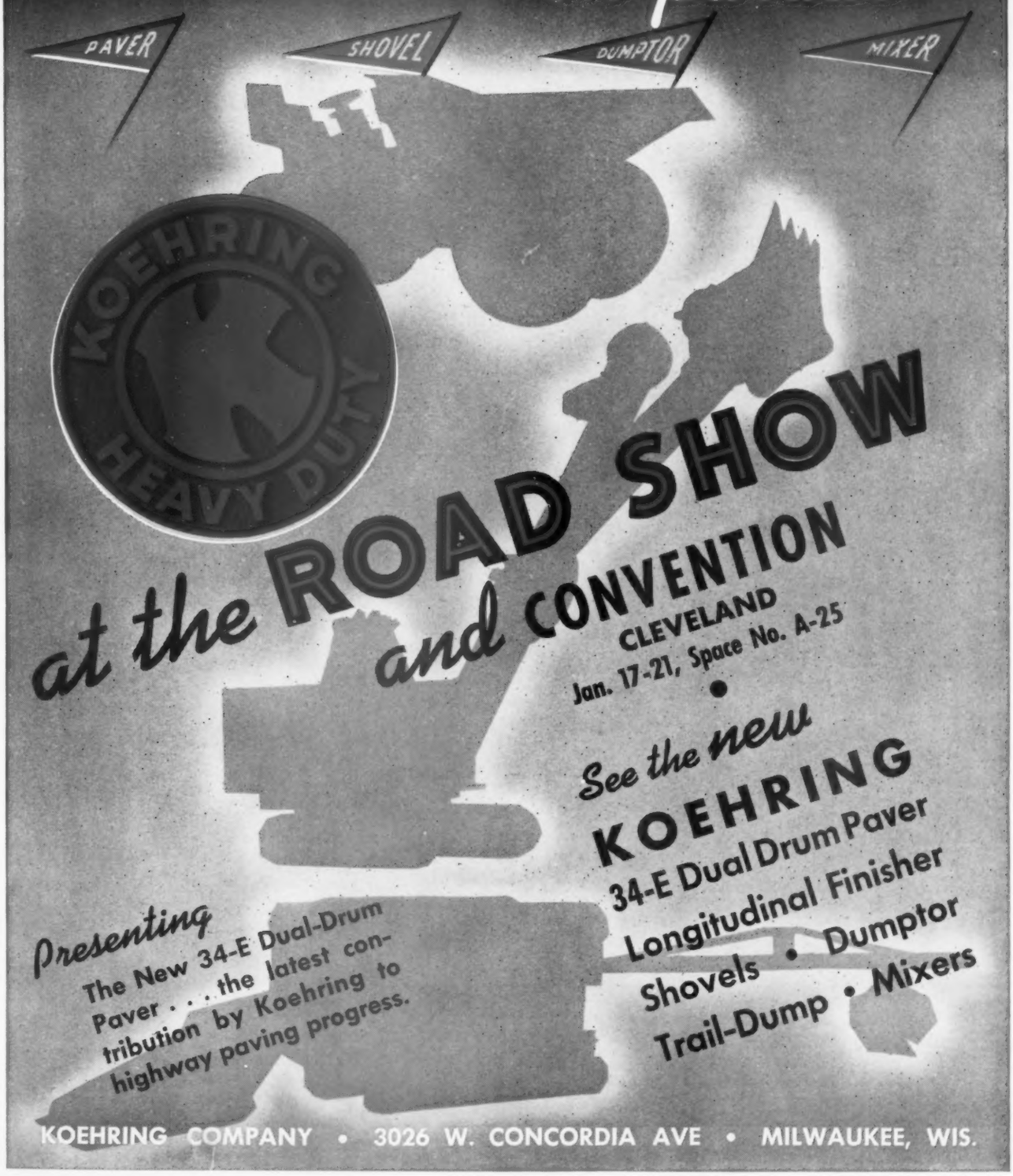
JOHN A. ROEBLING'S SONS COMPANY
TRENTON, N. J. *Branches in Principal Cities*

ROEBLING *Wire Screen*

TRADE JERSEY MARK

90 YEARS OF WIRE MAKING SPELLS THE DIFFERENCE

KOEHRING *heavy duty* CONSTRUCTION EQUIPMENT *on parade*



at the ROAD SHOW *and* CONVENTION

CLEVELAND
Jan. 17-21, Space No. A-25

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See the new

KOEHRING

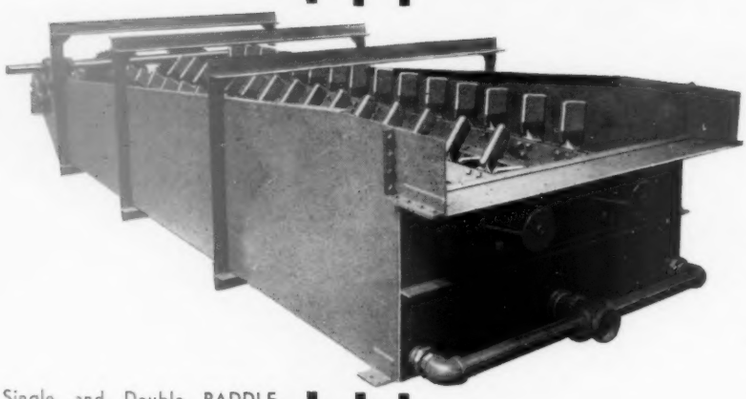
34-E Dual Drum Paver
Longitudinal Finisher
Shovels • Dumptor
Trail-Dump • Mixers

Presenting
The New 34-E Dual-Drum Paver . . . the latest contribution by Koehring to highway paving progress.

KOEHRING COMPANY • 3026 W. CONCORDIA AVE • MILWAUKEE, WIS.

EAGLE WASHERS AND DE-WATERERS

for every requirement in Sand, Gravel and Crushed Stone Production . . . . .



Single and Double PADDLE TYPE LOG WASHERS for difficult clay removal problems. Built with the same advanced features as in the Spiral Screw Type Washers, illustrated below.

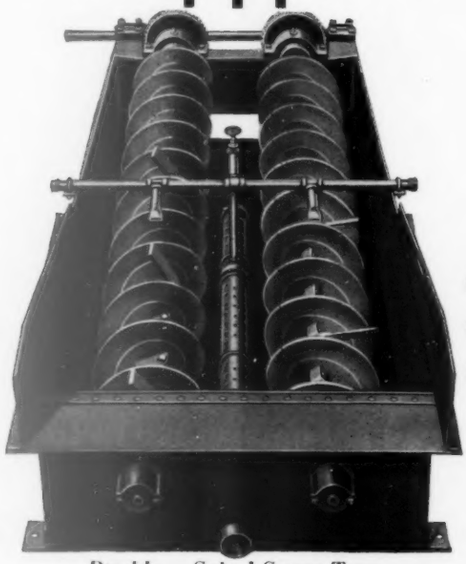
Write for Bulletins containing details of machines.

Who is better qualified to serve you than a long established company that pioneered washing equipment and developed it to its present high efficiency? Our experience is your assurance of success and satisfaction in using these machines.

Today we build such a complete line that there is a type and size of standard Eagle machine for your purpose regardless of the conditions you have to meet—you buy with the greatest saving and operate with the economy that belong with these finely engineered designs of Eagle washers.

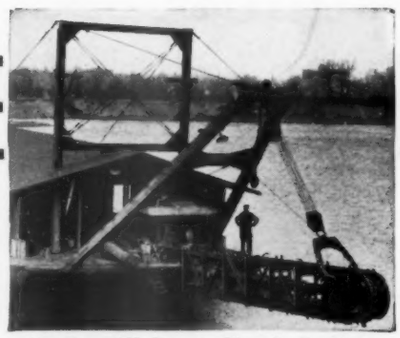
Note the distinguishing features of our washing equipment:—Extra length to give complete dewatering—Increased height of tub sides to provide a deep settling basin—special design of the dewaterer makes it possible to float off light foreign material—sturdy construction and durable mechanical details that have been proven by amazing records of service.

Tell us your problem, whether sand, gravel or crushed stone washing, and advise capacity requirements. We will send you full information—and let you be the judge of our recommendations.



Double — Spiral Screw Type

Double your capacity in hydraulic pumping of sand or gravel with the use of these chain type cutters. They eliminate all stoppages and insure an even flow of material — no pumping delays.



"Swintek" Screen Nozzle Ladders

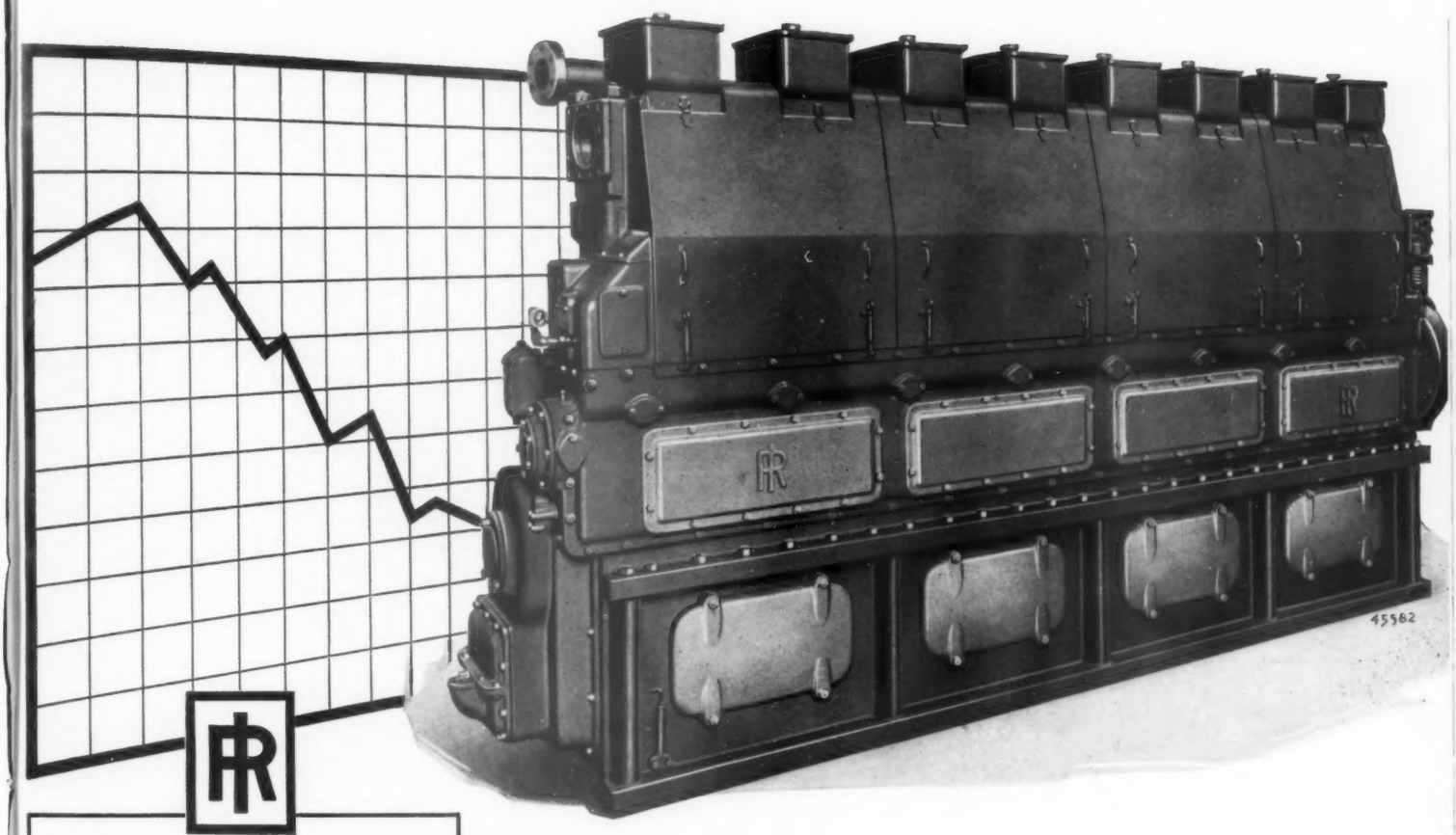
EAGLE Products Include:

EAGLE Double Roll Crusher
EAGLE Shale Planer
Olson Self-dumping Cages
Specialized Mining Equipment
EAGLE Dry and Wet Pans
EAGLE Grinder

EAGLE IRON WORKS
DES MOINES - IOWA

REDUCE YOUR POWER COSTS

with the Type "S" Engine



A few of the many advantages of Type S Diesels:

1. MODERN DESIGN
2. ✓ LOWER FUEL CONSUMPTION
3. LOWER INSTALLATION COSTS
4. MORE EFFICIENT POWER TRANSMISSION
5. INEXPENSIVE TO MAINTAIN
6. A THOROUGHLY PROVED ENGINE

TYPE S engines assure economical power production by combining low fuel consumption with efficient power transmission and low maintenance expense. Their quiet, efficient operation and clear exhaust are the result of perfect fuel combustion which means lower fuel consumption. Type S engines produce 20 brake horsepower hours per gallon of fuel.

This low fuel consumption means lower operating temperatures and therefore less severe stresses. This reduces maintenance and increases the life of the engine.

Let our engineers tell you more about the power savings possible with Type S engines.

Ratings 150 to 460 hp.; larger I-R units also available.

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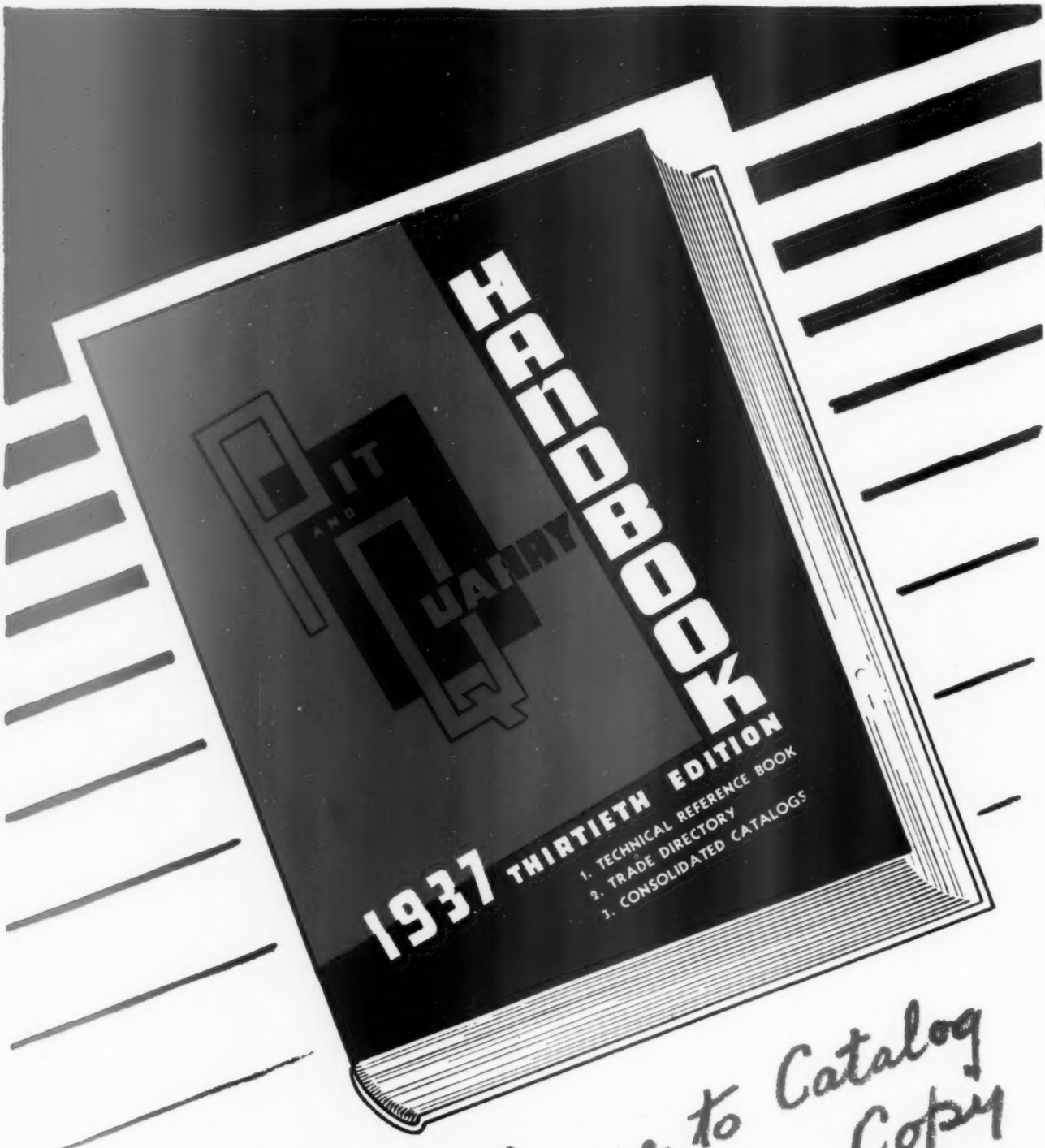


Last Chance to Catalog
Your Products.... Copy
Must be in Our Hands
by DECEMBER 15

Here's Your Market for 1938

Pit and Quarry HANDBOOK offers you 100% sales coverage for all of the coming year—a year that business leaders say will continue the sensational come-back for the heavy industries.

Housing programs, road building, land development projects and government construction on a huge scale, all point to an unprecedented demand for basic materials.

As the one and only Directory of all *producing plants* and *purchasing personnel* in the cement, gypsum, lime, sand, gravel and crushed stone fields, the HANDBOOK is the key to your advertising campaign.

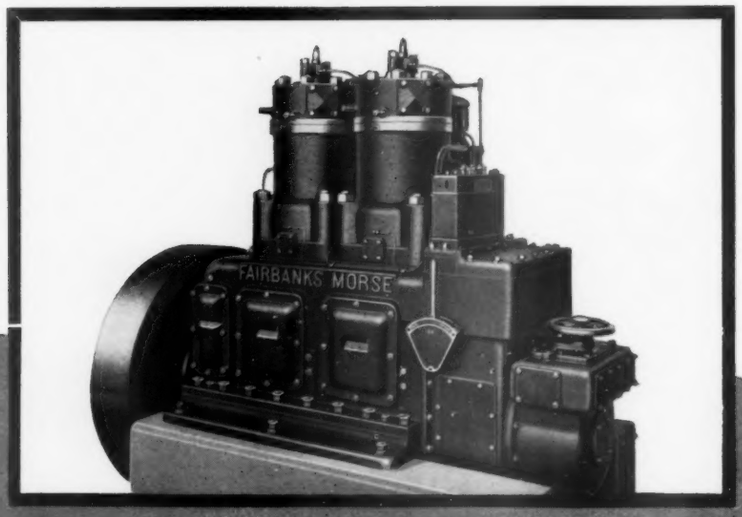
List your entire line in this Buying Manual of the Pit and Quarry Industry—and your sales message will go to every prospect who authorizes or approves purchases in the 5,100 producing plants in the industry.

This is your logical market and your 1938 advertising will not be complete unless you include a page or series of pages in the HANDBOOK to catalog your products.

Act now, before the closing date of publication makes you miss your market.

PIT AND QUARRY PUBLICATIONS

538 SOUTH CLARK ST., CHICAGO



New F-M 42 Diesel

BRINGS YOU HEAVY-DUTY STAMINA

WITHOUT "HEAVY" HORSEPOWER

2-Cyl.—60 HP. 450 R. P. M. 3-Cyl.—90 HP.

HERE'S an important point in selecting a Diesel—heavy-duty and "heavy" horsepower are far from being the same. The number of consecutive hours, days, months, that horsepower, small or large, is needed determines whether the job is heavy-duty. And light-duty engines can't stand heavy-duty punishment long.

The new Fairbanks-Morse Model 42 brings all the economies of Diesel power to many jobs where compromises have had to do. A small edition of the pace-setting F-M 32, the F-M 42 is of 2-cycle design and incorporates the efficiency-multiplying, backflow scavenging principle. In work per dollar it has never been topped, and its simplicity guarantees economy of maintenance.

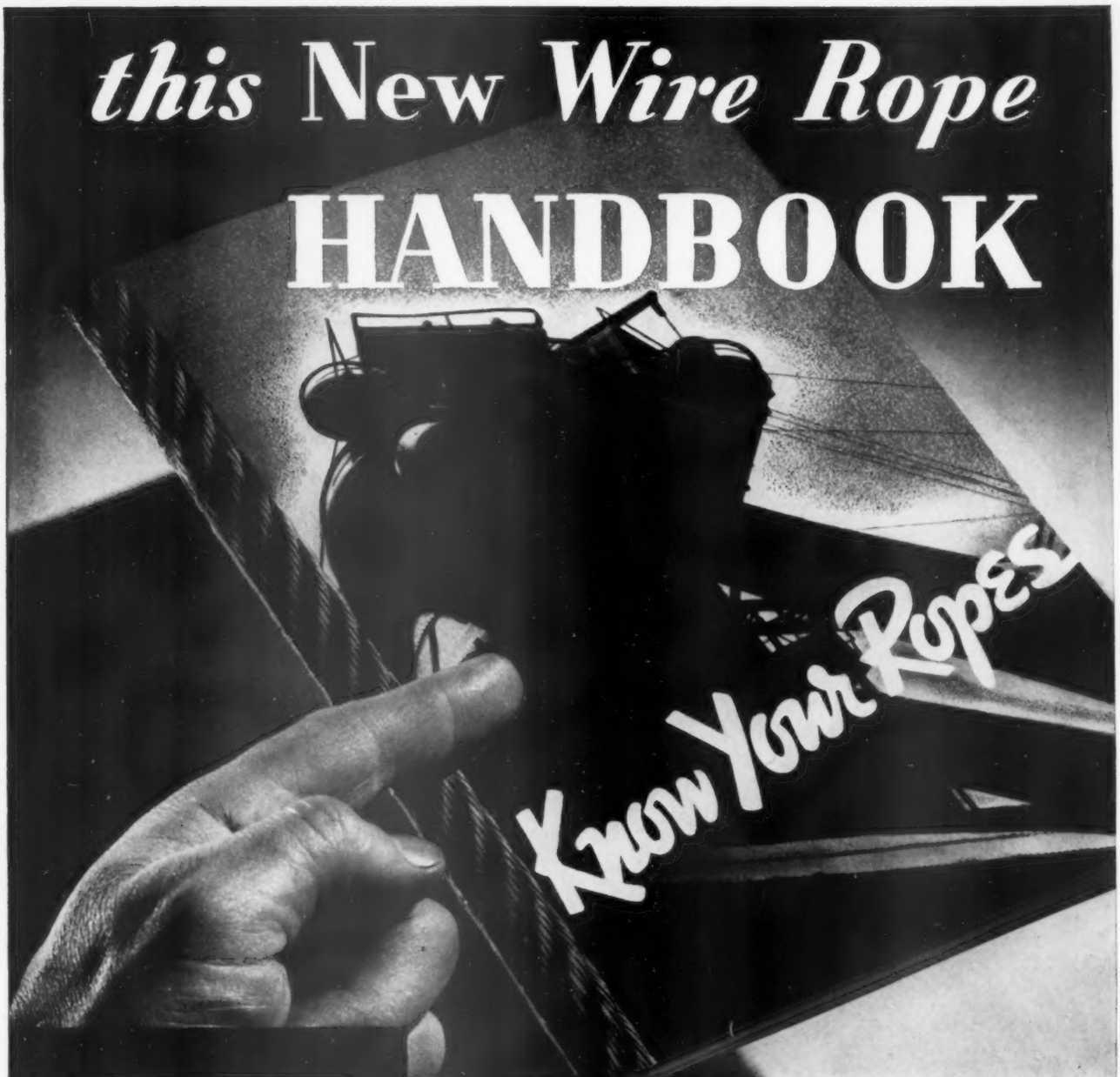
Wherever you need only 60 or 90 horsepower but at the same time need heavy-duty stamina, the F-M 42 will save you money and outlast the job. Bulletin 4200-81 gives complete information on this latest development of the world's largest builders of Diesels. Write Fairbanks, Morse & Co., 900 So. Wabash Avenue, Chicago, Illinois. 34 branches at your service throughout the United States.

FAIRBANKS MORSE

DIESEL ENGINES
PUMPS
ELECTRICAL MACHINERY
FAIRBANKS SCALES
RAILROAD EQUIPMENT
WATER SYSTEMS
REFRIGERATORS
RADIOS
WASHERS
FARM EQUIPMENT
STOKERS
AIR CONDITIONERS

Diesels

this New *Wire Rope* HANDBOOK



80 PAGES

of valuable, easy reading information on how to make wire rope yield longer service through proper selection and care when in use. Not one line of advertising. If you have not already made your request, fill in the coupon below and receive a complimentary copy. IT WILL SAVE YOU MONEY.

WIRE ROPE *by Wickwire Spencer*

WICKWIRE SPENCER STEEL COMPANY
41 East 42nd St., New York City

Please send me a complimentary copy of your new wire rope handbook "Know Your Ropes".

Name_____

Firm_____

Address_____

City_____ State_____ P and Q

THE MOST ECONOMICAL TOOL *Ever Developed* FOR ROCK DRILLING

Any way you look at it the TIMKEN Rock Bit effects large savings for its users.

It saves time because it drills faster. It saves money because it lasts longer.

These are direct, fundamental economies resulting from the streamlined design of the TIMKEN Bit and the material from which it is made (TIMKEN Steel).

Other economic advantages of a more or less indirect but no less valuable nature are: Less capital investment in drill steel. Less capital investment in forging and heat treating equipment. Reduced nipping costs.

Forged steel has had its day—and a long day it was. Progress will have its way, however, and a more modern, more efficient tool—the TIMKEN Removable Rock Bit—is rapidly taking its place.

If you are not using TIMKEN Bits it will pay you to give them a thorough trial. Write for name and address of nearest distributor.

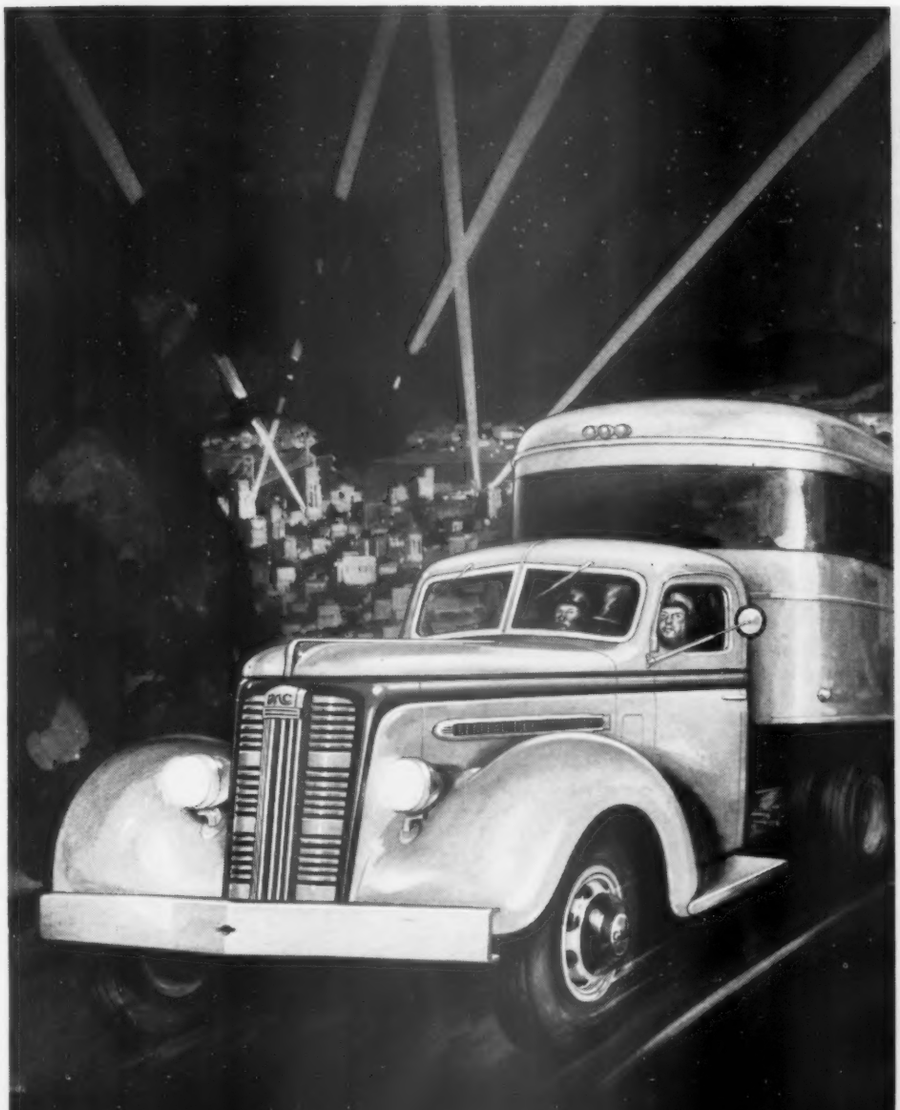
8 Budd-built Zephyrs are now rolling on TIMKEN Bearings.

Glide — as you ride a Timken-equipped Train

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN ROCK BITS

Manufacturers of Timken Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; Timken Alloy Steels and Carbon and Alloy Seamless Tubing; Timken Rock Bits; and Timken Fuel Injection Equipment.



GMC *Announces* FOR 1938

- IMPROVED DUAL-TONE APPEARANCE
- GREATER DRIVER COMFORT AND CONVENIENCE
- BIGGEST STANDARD BODIES IN THE INDUSTRY
- MECHANICAL BETTERMENTS
- GMC PRICES STILL CROWDING THE LOWEST
- LOWEST PRICES FOR STANDARD CAB-OVER-ENGINE MODELS

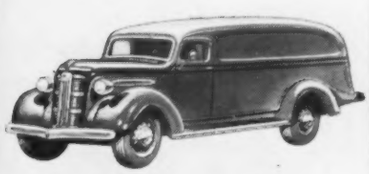
GMC offers for 1938 three new fast-duty models, a new ¾-ton, a new 1-ton—and a stalwartly built 1¼-ton model. GMC introduces a long list of mechanical betterments, notably improving its extensive line. GMC unveils a new stream-style dress, a still finer evolution of its already famous "Dual-Tone" design. And GMC offers all models ½ to 12 tons *at prices that are still crowding the lowest!* See these trucks—see your GMC dealer.

THE TRUCK OF VALUE GMC

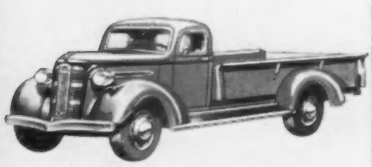
GENERAL MOTORS TRUCKS & TRAILERS

Three NEW MODELS *and a* FULL LINE ½ TO 12 TONS

Built to shoulder loads not practical for lighter trucks, GMC's new ¾-ton, new 1-ton, and new 1¼-ton models are stoutly framed, amply powered, and equipped with the biggest standard bodies (panel, pick-up and stake) that trucks in this class afford! GMC now offers longer-life trucks in the "light heavy-weight" class—sized for every specific haulage requirement—and all with GMC traditional high quality—all priced down near the lowest!



new 3/4-TON



new 1-TON

new 1¼-TON

WHAT ABOUT ENGINEERING QUESTIONS OF THE SAND AND GRAVEL AND READY-MIXED CONCRETE INDUSTRIES?

Bituminous Construction

Has the sand and gravel industry secured its share of that important market? To what types of bituminous construction are sand and gravel best adapted? What specifications should cover our further development of that field?

Deleterious Substances in Aggregates

How do deleterious substances and impurities in aggregates affect the finished product? How can they be recognized and guarded against? What do specification writers think about them?

Industrial Research

Does industrial research pay? What is the nature of the new program adopted by the National Sand and Gravel Association for carrying out imperative researches? Why should its details be familiar to every producer? What problems should be attacked first?

Railroad Ballast

What is good gravel ballast? How much of it is used? What is the attitude of the railroads toward properly prepared gravel ballast? Who writes the specifications covering its use? Will the railroad ballast market improve in 1938?

Round Table on Specifications

What is the situation in the various states as to sand and gravel specifications? What has been done locally to improve unwise and uneconomic specifications? What can individual groups do to correct the specifications which adversely affect the established industry?

What Do We Know About Concrete

Or, for that matter, what don't we know about concrete? How far has research brought us toward the point where concrete can be used most efficiently? What are the principal questions yet remaining unanswered concerning this most important material? What is being done to answer them?

Design and Control of Concrete

What is the status of that art? How important is the part played by aggregates? What can proper design and control do in the improvement of the quality of concrete?

A Ready Mixed Concrete Market

How can a company go about the job of developing markets for ready mixed concrete? What are the potentialities of different markets? Which is more effective, personal contacts, newspaper advertising, or direct mailing?

Truck Mixer Standards

How can truck mixers and agitators be used most efficiently? What has been done in the development of standards for such use? What remains to be done?

Concrete Merchandising and Servicing

What has been the experience of important companies in attacking the problems of merchandising and servicing ready mixed concrete? How have they solved the many complex problems attendant upon this relatively new business, such as delivery time, waiting time, sales based upon quality of finished product, and the like?

AND, BUT NOT IN CONCLUSION

What about such questions as: the production of sand and gravel for large projects; lime putty plants; and the many other questions of an engineering flavor now before the two industries? Not only will they be the mainspring of many personal conversations, but they will also form the subject of important addresses at the

Twenty-second Annual Convention and Exposition
NATIONAL SAND AND GRAVEL ASSOCIATION

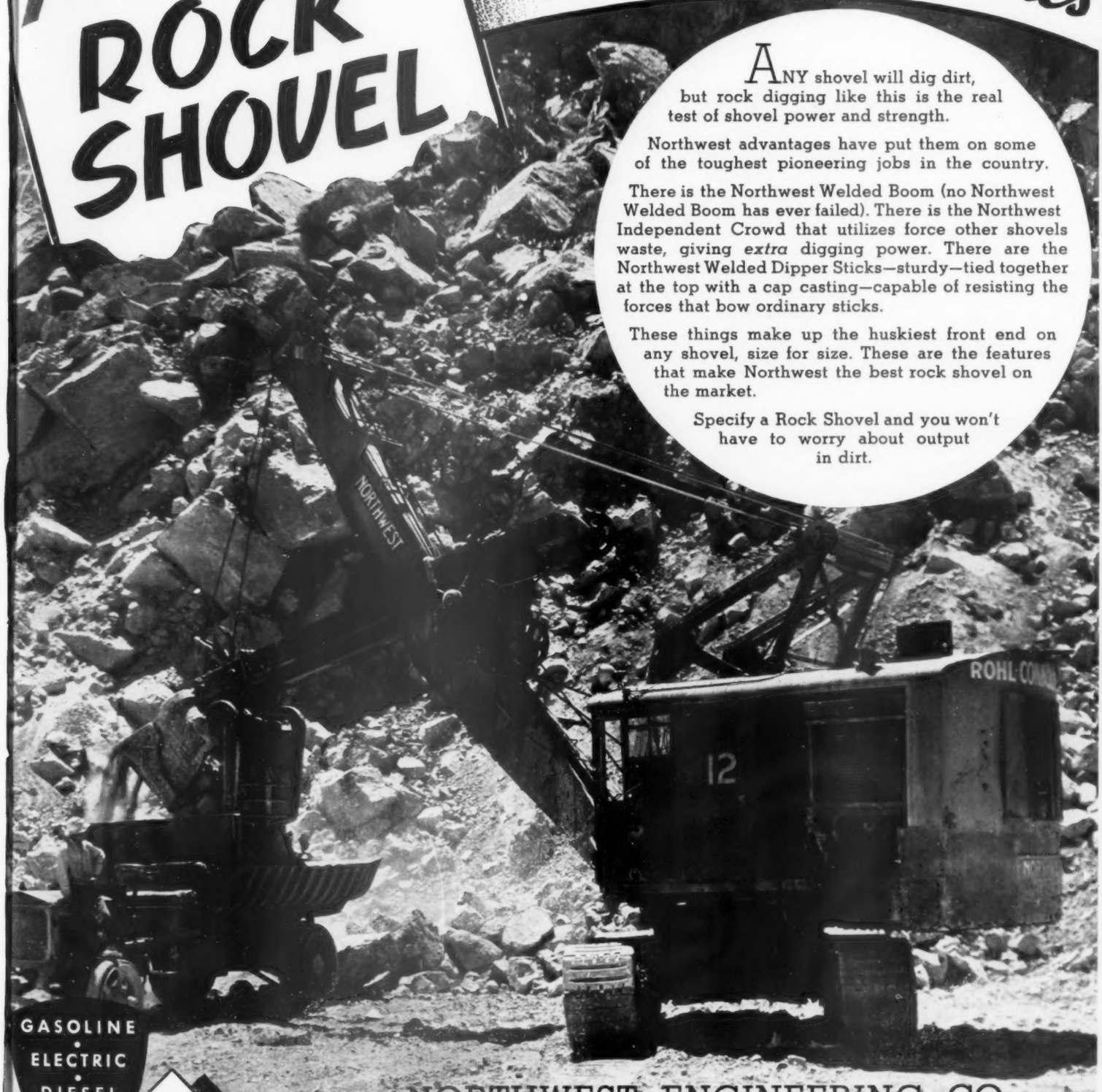
Eighth Annual Convention and Exposition
NATIONAL READY MIXED CONCRETE ASSOCIATION

NETHERLAND PLAZA HOTEL **CINCINNATI, OHIO**

January 31, February 1, 2 and 3, 1938

A Good ROCK SHOVEL

must have good rock shovel features



ANY shovel will dig dirt, but rock digging like this is the real test of shovel power and strength.

Northwest advantages have put them on some of the toughest pioneering jobs in the country.

There is the Northwest Welded Boom (no Northwest Welded Boom has ever failed). There is the Northwest Independent Crowd that utilizes force other shovels waste, giving *extra* digging power. There are the Northwest Welded Dipper Sticks—sturdy—tied together at the top with a cap casting—capable of resisting the forces that bow ordinary sticks.

These things make up the huskiest front end on any shovel, size for size. These are the features that make Northwest the best rock shovel on the market.

Specify a Rock Shovel and you won't have to worry about output in dirt.

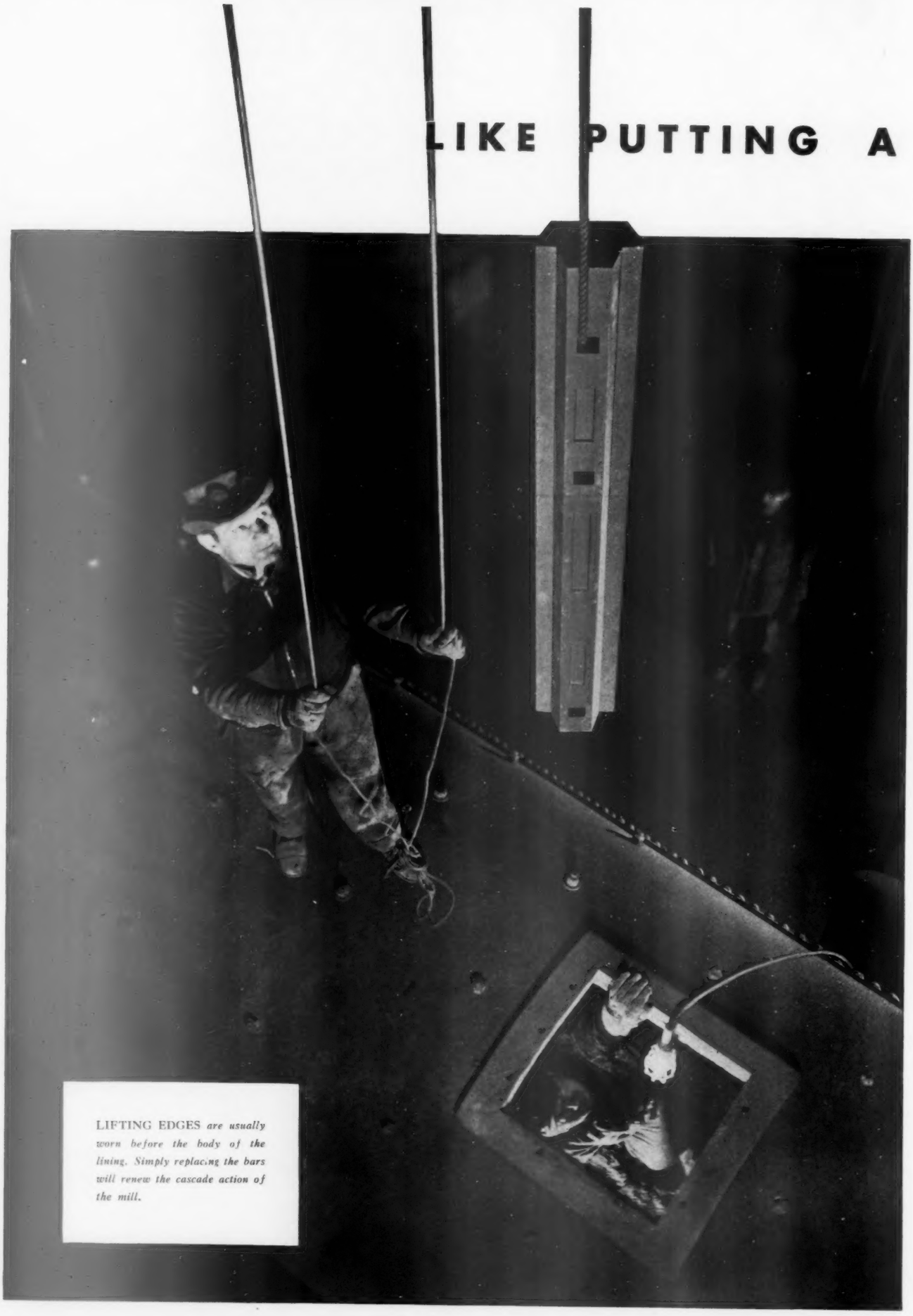
GASOLINE • ELECTRIC • DIESEL • OIL

Built in a range of 18 SIZES 3/8 yd. capacity and Larger

NORTHWEST ENGINEERING CO.
1727 Steger Bldg. 28 E. Jackson Blvd. Chicago, Ill.

NORTHWEST

LIKE PUTTING A



LIFTING EDGES *are usually worn before the body of the lining. Simply replacing the bars will renew the cascade action of the mill.*

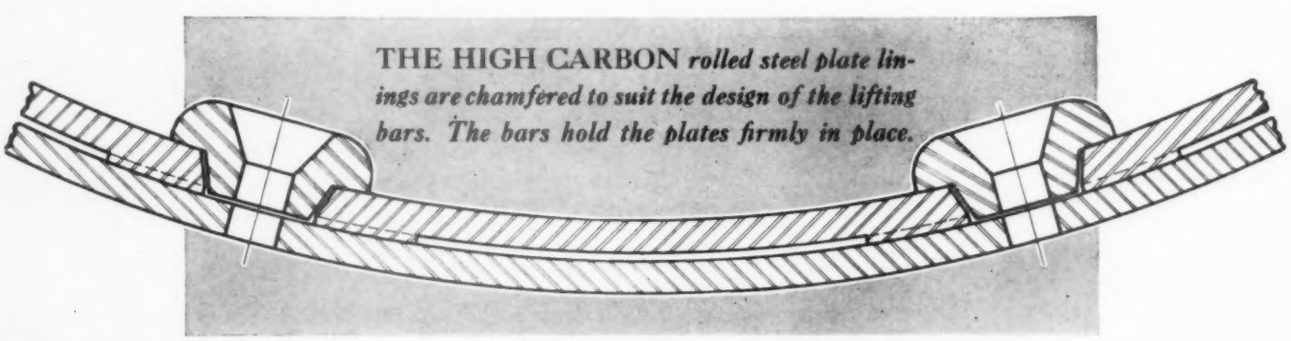
NEW BLADE IN THE OLD RAZOR

YOUR morning shave would be pretty expensive if you had to buy a new razor every time the cutting edge became dull. Instead, you get renewed cutting action by inserting a new blade. In your grinding mills you can get renewed grinding action by using this same principle . . . by replacing only the worn part.

With older style cast linings, worn edges reduce lifting action, and the whole plate has to be changed. When you use the new USS Lorain Rolled Steel Plate Lining, you can get new lifting action by reversing or renewing the lifting bars alone. The liner plate itself need not be changed, because it usually out-wears the heavily punished lifting edge.

USS Lorain Rolled Steel Plate Lining is made of Carnegie-Illinois Controlled high carbon steel. Its strength permits linings of reduced thickness and weight. Consequently the capacity of the mill for grinding purposes is proportionally increased, in both weight and volume.

Your present mills can be relined with USS Lorain Rolled Steel Plate Lining. It is easy to install. It can be adapted to the size of the mill, type of grind, and size of grinding balls used. Our experienced engineering staff will gladly study your grinding mills and problems. They will make specific recommendations for the use of this long-lasting, efficient lining in your grinding mills.



THE HIGH CARBON *rolled steel plate linings are chamfered to suit the design of the lifting bars. The bars hold the plates firmly in place.*

U·S·S LORAIN ROLLED STEEL PLATE LINING

CARNEGIE-ILLINOIS STEEL CORPORATION

Lorain Division *Johnstown, Pa.*

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*

United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

THE 21st ANNUAL CONVENTION

OF THE

NATIONAL CRUSHED STONE ASSOCIATION

Offers to Crushed Stone Producers a Program of Exceptional Merit

Included among the topics scheduled for discussion are the following:

What is the Future of Private Enterprise?

Diesel Power in the Crushed Stone Industry

The Correlation of the Los Angeles Rattler Test and Service Behavior

Labor Relations in the Crushed Stone Industry

Federal Wage and Hour Legislation

Many other subjects of equal interest will appear on the program—all will be presented by men outstanding in their fields. The Manufacturers' Division Exposition will be the largest and most comprehensive held in recent years—this feature alone well warrants attendance.

Plan now to be present at the Netherland Plaza Hotel, Cincinnati, Ohio, on January 24, 25 and 26, 1938, for the most important event of the year to crushed stone producers.

SYMONS CONE CRUSHERS

There are reasons why

so many plants producing crushed materials are turning to Symons Cones for their fine crushing operations. With a definite trend toward the use of finer materials, many plants are handicapped in providing the required sizes in sufficient quantities and at costs in keeping with profitable operation.

The Symons Cone was developed primarily for reduction crushing. Its unusual process of crushing, its different construction, its special operating features, are all factors which combine in giving this Crusher its enormous capacity of finely crushed product. There is little wonder that it is used by leading producers throughout the world. The three installations shown in stone, slag and gravel plants are typical of the many found in the industry.

●

With the Symons Standard Type Cone built in seven sizes with crushing heads ranging from 20 inches to 7 feet in diameter, and the Short Head Cone in four sizes, there is a Cone for any capacity and size of product that may be desired. When confronted with a fine crushing problem, see what Nordberg has to offer in the Symons Cone.

●

NORDBERG
MFG. CO.
MILWAUKEE, WIS.

NEW YORK CITY 60 E. 42nd St.
LOS ANGELES Subway Term. Bldg.
TORONTO Concourse Bldg.
LONDON Bush House
MEXICO CITY Edificio Cook

YOUR BUSINESS...IS ITS FUTURE SECURE?

EVERY business is exposed to the normal risks of failure through poor management, of destruction by competition, of death through the lack of capital. These hazards have always surrounded business, but in these days they are greater and preventive measures must be correspondingly greater.

To-day's conditions present still other dangers—confiscation through exhorbitant taxation; attacks by competitive industries in addition to competitive producers; the threat of a more class-conscious labor group; the likelihood of stricter regulation of business practices by national and state governments; the challenge of co-operative enterprise.

All these attacks, all these impending dangers, are organized; they represent mass expression of mass sentiment, group pressure for group ends. Does your business face these dangers as a part of industrial organization? Is it prepared, by co-operative association with other similar businesses similarly situated, to meet these newer and more serious threats to its future security? Has it cast its lot with that of its natural indusrial allies, those who, although competitors for your prospects' patronage, are your logical comrades when outside trouble looms?

Or, is your business standing alone, weak, perhaps powerless, because unaided? Have you decided to face the future as the stark individualist, the "lone wolf", determined to fight alone and die alone?

There never was a time when every business stood more in need of the spiritual, financial, even physical support provided by numbers, by co-operative effort, by pooled resources. There never was a time when an individual business—your business, perhaps—could less afford to run the risks that surround all businesses. There never was a time when your business was exposed to more or greater dangers than beset it to-day.

Your industry has a fighting body—an organization watching your interests, working for the betterment of conditions affecting your business, warding off unfair attacks and girding itself for future frays. Join it. Make yourself a part of it. Contribute money and counsel to further its aims. Help it by giving it a share of your courage, strength and determination. . . . And help yourself by placing your future in the hands of those who, acting for you and in your behalf, can serve you, protect you, make your future less insecure, better and more certainly than you could ever hope to do yourself.

You may long have contemplated taking such a step, because surely you often have felt some of the insecurity that is inherent in "going it alone". Hesitate no longer! Organize for defense against the organized dangers that threaten; organize for offense against the many problems that confront you.

If you already belong to your industry's national association, write its secretary a letter telling him why you continue your membership and what benefits you receive from it. Not only will it please and encourage the association's staff, but it might be used effectively to help some non-member decide to join. Helping to get new members is as much a responsibility of membership as the payment of dues.

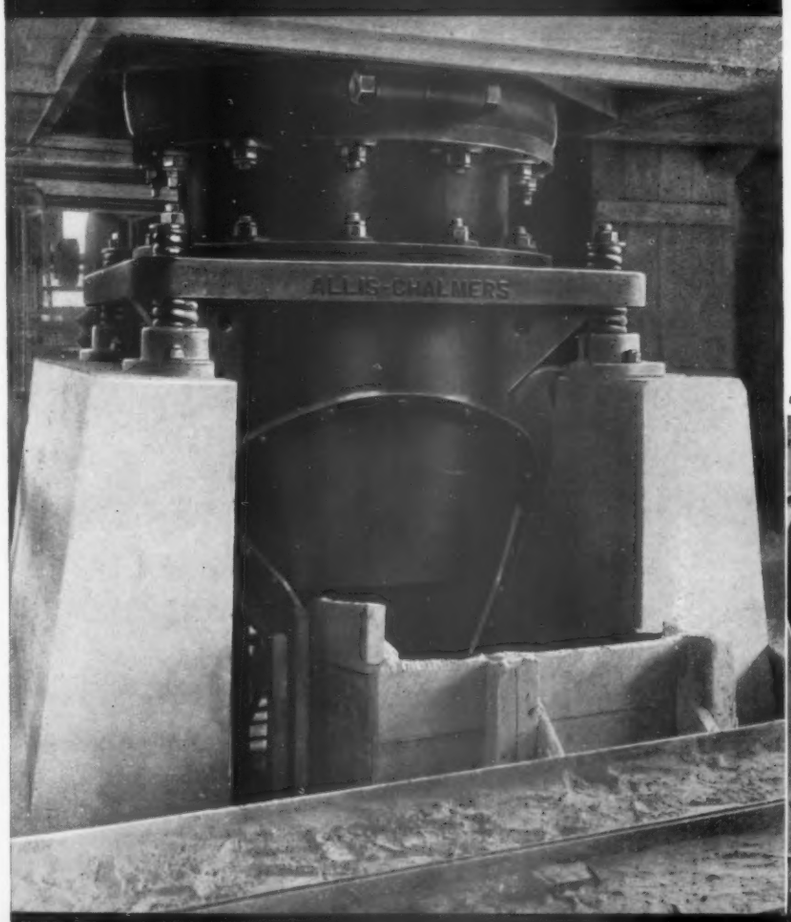
This advertisement has been prepared and the space for it donated by Pit and Quarry Publications voluntarily in the interest of promoting trade association membership and it appears without the knowledge of any association officer or member.

Flexible INSTALLATION

THE Newhouse is the one crusher that offers complete flexibility of installation. You can hang it from beams by means of cables or mount it on a concrete foundation with spring support, whichever works best for your plant.

OUTSTANDING FEATURES

1. Minimum number of working parts.
2. No gears and belts.
3. Minimum power requirements.
4. Large unobstructed feed opening.
5. Steep diaphragm, insuring free discharge.
6. Low oil consumption.
7. High ratio of reduction and uniform product.
8. Reversible non-choking concaves.
9. Self-contained with discharge spout, allowing crushed material to be fed direct to elevator or conveyor without additional hopper or chute. For discharging directly into bins or onto conveyor crusher can be supplied with welded steel bottom shell eliminating diaphragm and spout.
10. Large capacity.
11. Low installation cost.
12. Accessibility of moving parts.



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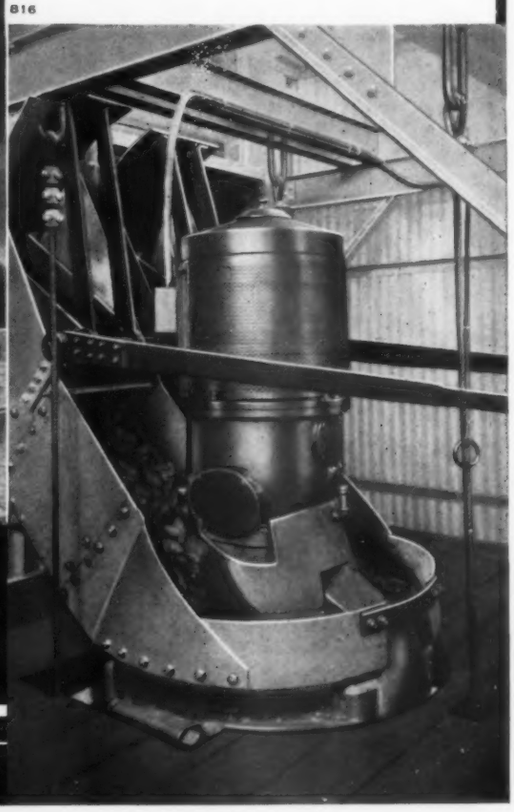
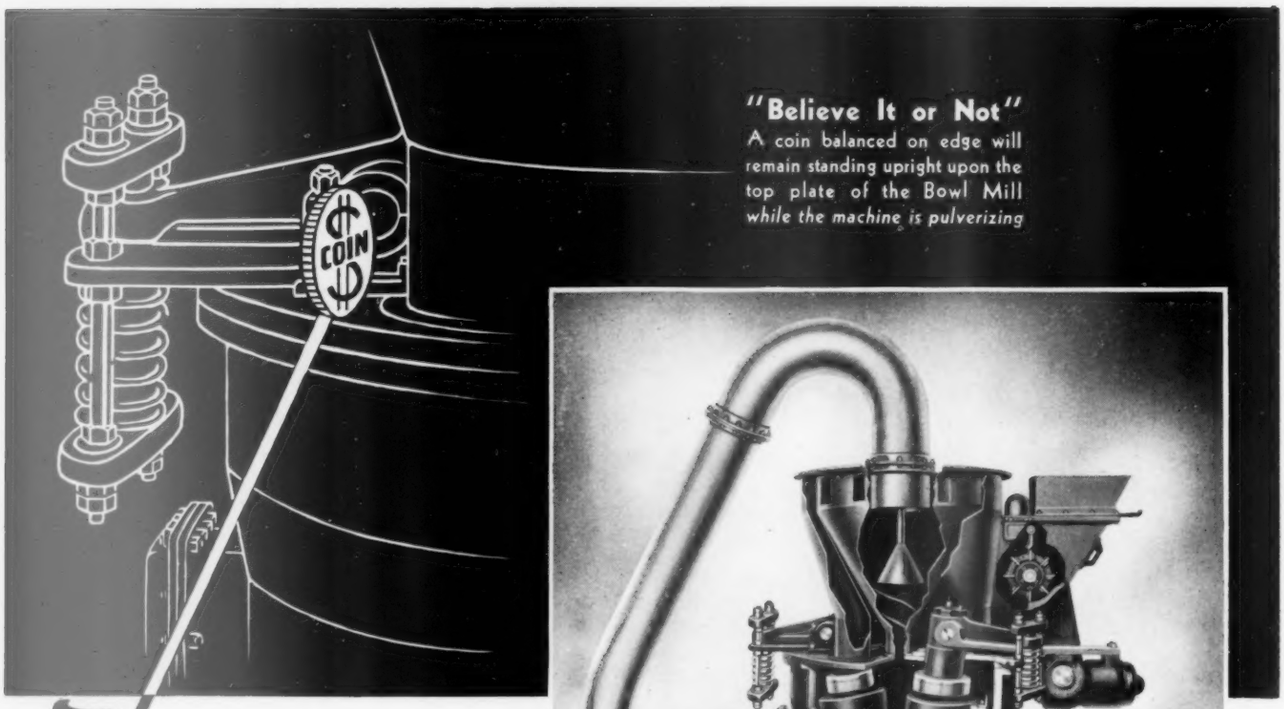


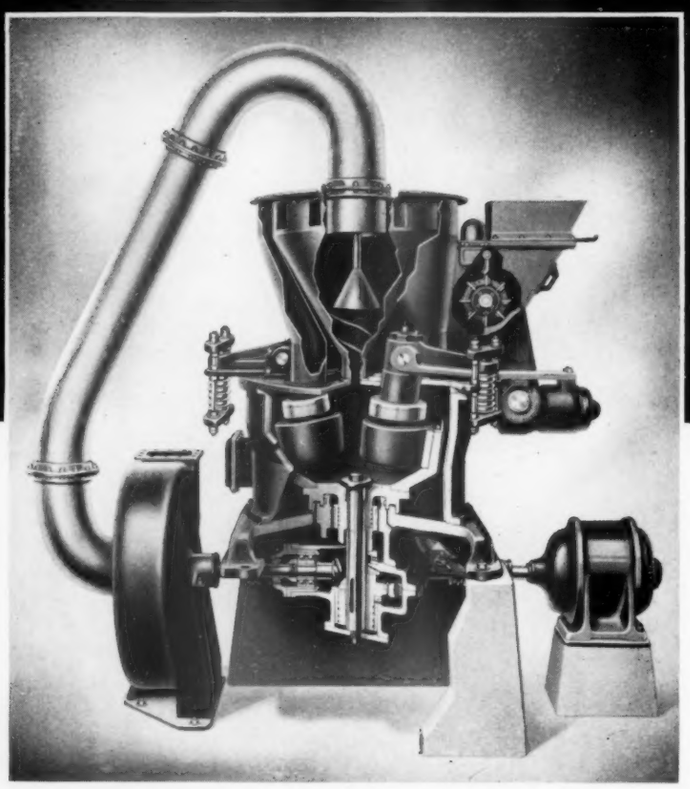
EQUIPMENT ENGINEERS TO INDUSTRY

ALLIS • CHALMERS

MILWAUKEE WISCONSIN



"Believe It or Not"
A coin balanced on edge will remain standing upright upon the top plate of the Bowl Mill *while the machine is pulverizing*



The... Coin Test PROVES

the Smooth Operating Qualities of The... BOWL MILL

Why tolerate destructive vibration in your grinding equipment? *No metal-to-metal contact,* as achieved in the Bowl Mill method of pulverizing, eliminates noise and vibration . . . reduces wear and depreciation . . . and breaks all records for economy in coal grinding and direct firing rotary kilns. Bowl Mills need no cushioning to absorb vibration. They can be set on any type of floor strong enough to support the weight.

RAYMOND BOWL MILL

Write for a copy of Bulletin No. 27

RAYMOND PULVERIZER DIVISION
COMBUSTION ENGINEERING COMPANY, INC.
1321 North Branch Street **CHICAGO**
Sales Offices in Principal Cities • • • In Canada: Combustion Engineering Corporation, Ltd., Montreal

APR 15 1938

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PIT AND QUARRY

Vol. 30 December, 1937 No. 6

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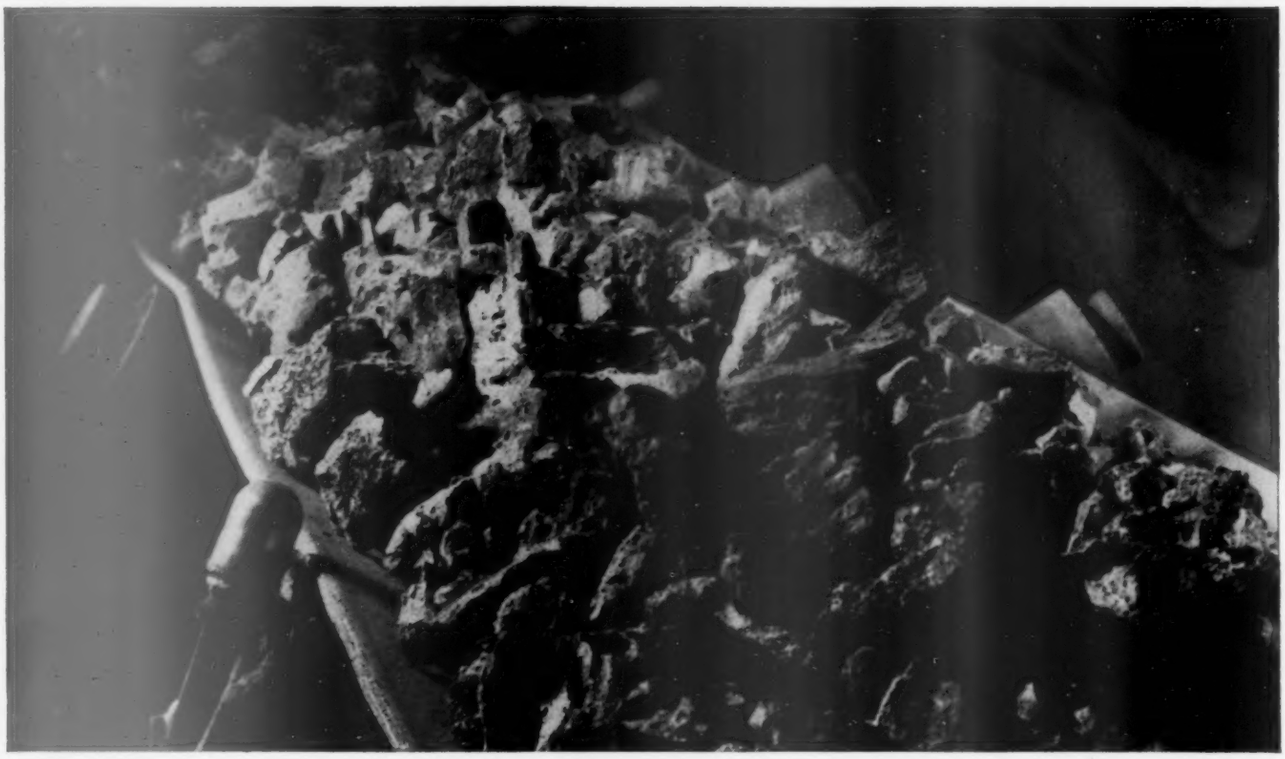


Sharp reduction in tonnage costs . . . cheaper handling of rock products . . . that's what HEWITT conveyor belt can achieve for you. It is a matter of fact that wherever the choice of conveyor belt is decided by handling cost per ton, HEWITT is usually selected. For built into every HEWITT conveyor belt are the longer life, extra stamina and added toughness to fight off punishing use. That's the result of superior workmanship and advanced design. You'll find that a HEWITT conveyor belt can give you astonishing performance. You'll get dependable, unfailing service day in and day out that will bring tonnage costs lower and lower. If you want lower operating costs, those are dollars-and-cents facts that make HEWITT conveyor belt worth looking into.

HEWITT

RUBBER CORPORATION

BUFFALO, NEW YORK

HOSE • CONVEYOR AND TRANSMISSION BELTS • PACKING

I. C. C. Allows Boost in Ex Parte No. 115

INCREASE TO BE 5-10 C. A TON

On October 19 the Interstate Commerce Commission announced its decision in Ex Parte No. 115 which allows the increasing of rates on most commodities and also modifies outstanding maximum-rate orders by authorizing the carriers to publish tariffs carrying increased rates on practically all of the commodities handled by rail.

As to sand and gravel, crushed stone, and slag, the carriers propose the following: Rates over 60 c. per ton to and including $1.00 per ton, an increase of 5 c. per ton; rates over $1.00 per ton, an increase of 10 c. per ton.

Tariffs incorporating these increases are being filed with the Interstate Commerce Commission, the increased rates to become effective on 30 days notice. These tariffs are subject to protest and suspension, and producers are advised, therefore, to discuss their individual freight-rate situations with the traffic officials of carriers serving their plants and to determine at once whether such carriers will take advantage of their authority to file tariffs with the Commission increasing the rates. If such tariffs are to be filed, producers should move immediately, if they believe that an increase in the manner calculated would be harmful to the legitimate interests of their companies, to ask the Commission to suspend the effective date of the tariff pending an investigation and an opportunity to protest.

Due to the tremendous number of tariffs carrying the rates, it is evident that it would be almost physically impossible to maintain a check over each and every tariff as it is filed with the Commission carrying the proposed increase of 5 c. and 10 c. per ton.

In addition to the authority thus obtained to file new tariffs increasing rates, the carriers have petitioned the Interstate Commerce Commission for a superimposed horizontal increase of 15 per cent. on all commodities; in other words, the 15-per cent. increase would be applied to the basic rate plus the 5 c. or 10 c. increase, as the case may be. Notice has been issued by the Secretary of the Commission dated Nov. 8 that this newest petition of the carriers has been docketed under Ex Parte No. 123 and will be identified as the Fifteen Per Cent. Case, 1937. The Commission will conduct hearings at Washington beginning Monday, November 29. The initial hearing before this group of commissioners will be utilized by the carriers in justifying the proposed 15-per cent. increase.

It is the purpose of the National Sand and Gravel Assn., in coöperation with other organizations similarly affected, to intervene in Ex Parte No. 123 of the Interstate Commerce Commission and to state the reasons which move the industry to insist that a superimposed increase of 15-per cent. will be detrimental to the interests of the railroads and the aggregate industry.

Quarry Firm Ordered to Reinstate Three Workers

Charles B. Bayly, trial examiner in the National Labor Relations Board hearing of charges against the Inland Lime & Stone Co. conducted at Manistique, Mich., in October, has issued his intermediate report in which he has recommended that the company be ordered to reinstate three former employes, allegedly discharged for union activity. The trial examiner has also recommended that the company be ordered to pay the men wages which they would have earned from the dates of their layoff and discharge to the dates of their reinstatement, less any amount they have earned during that period.

George F. Coffin, 67, Dies at Nazareth, Pa.

PROMINENT IN CEMENT AFFAIRS

George F. Coffin, secretary-treasurer and general manager of the Nazareth Portland Cement Co., and a former president of the Cement Institute, died at his home in Nazareth, Pa., on Oct. 25. He was 67 years old.

Mr. Coffin was a native of Northampton County, Pennsylvania, and was graduated from Lafayette College in 1894. He studied law under the late Gen. Frank Reeder, Sr., and was admitted to the bar in 1896. He took an early interest in the cement industry and served several terms as a member of the board of directors of the Portland Cement Assn. being elected its chairman in 1933.

Funeral services were held Oct. 28, from his home at Cedar Gates, near Nazareth, and representatives from almost every cement company in the eastern territory attended.

To succeed Mr. Coffin as general manager the company has announced the appointment of Harold B. Robeson, formerly a vice-president, while Howard M. Whiting has been advanced to secretary-treasurer. C. F. Michael has been made assistant secretary and S. J. Fehnel, assistant treasurer.

New Members Announced by Crushed-Stone Assn.

The Erie Stone Co., Indianapolis, Ind., and Blue Rock, Inc., Washington Courthouse, O., are two new active members of the National Crushed Stone Assn., according to J. R. Boyd, administrative director.

Associate members who joined during the past month include the Blaw-Knox Co.; Pressed Steel Car Co. (Koppel Division); Caterpillar Tractor Co.; and the Ross Screen & Feeder Co.

U. S. Cement Industry in Safety Tribute

25-YEAR RECORD CELEBRATED

Sarah Bernhardt was laying them in the aisles with Camille. People everywhere were telling Ford jokes. Teddy Roosevelt's Rough Riders were organizing to lead the battle for the Bull Moose. The first parachute jump in the history of aviation was made and a nifty comeback was "twenty-three skiddoo."

That was in 1912.

And in that year about 16 per cent. of all plant employees of the Portland-cement industry were injured at their work.

To-day, 25 years later, a streamlined Camille has come out of Hollywood. Ford jokes are about as rare as bustles and mass parachute jumping is old stuff.

This is 1937.

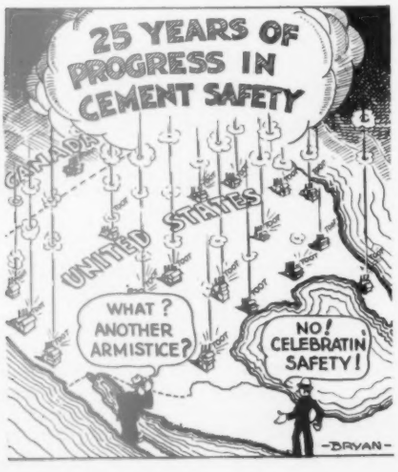
And in this year only about 1 per cent. of the people engaged in the manufacture of Portland cement will have suffered injuries severe enough to cause them to lose time from work.

And so, on November 24, the day before Thanksgiving, these thousands of men gathered, each in their own plant, for a simultaneous mass meeting throughout the United States and Canada in celebration of 25 years of progress in organized safety work in the cement industry.

During the meeting each plant tuned its radio to the nearest station on NBC's Blue Network to hear a 15-minute nation-wide congratulatory broadcast by several nationally-known speakers. Time for this broadcast was donated by the National Broadcasting Co.

At each of these meetings men who have given twenty-five or more years of service to the industry were specially honored. In 117 plants these celebrations were held in the shadow of safety trophies that signify the passage of one, and in many cases, several years without a single lost-time accident. In many cases these trophies tell the story of from two to ten consecutive accident-free years.

Many plants displayed signs that called the attention of the passing public to this silver anniversary.



New Road-Stabilization Plant Built in Ohio

The Ohio Gravel Co. has erected a plant for the preparation of road material stabilized with calcium chloride at Newtown, O., a suburb of Cincinnati. The material is being produced and marketed under the tradename "RoadCrete". The various materials are handled by an Osgood ¾-cu. yd. crane and mixing is done in a Brewer pug-mill. Most of the remainder of the equipment was designed and built by engineers of the Ohio Gravel Co.

The plant was formally opened early in October and a large number of road engineers and builders from Ohio, Indiana and Kentucky were present.

City Closes Pit; Held Hazard to Children

The board of public works at Seattle, Wash., recently canceled the permit of the Queen Anne Sand & Gravel Co. to operate its pit near First Ave. W. and West Fulton St., with recommendations to the city council that the property be purchased and filled in.

The pit was regarded a perpetual danger to school children due to water collecting in it.

Texas Senate to Probe Identical Cement Bids

The Texas state senate, in the course of a recent special legislative session, passed a resolution setting up a committee to investigate identical bids on cement received by the Texas Highway Commission with a view to determining whether the Texas anti-trust laws have been violated.

Revised Chicago Building Code Favors Concrete

New requirements for reinforced concrete and concrete masonry included in the part of Chicago's new building code which has passed the city council place these materials in a much better competitive position.

Pennsylvania Firms Ask 44-Hour Week Exemption

Pennsylvania clay, glass and stone industries asked the state industrial board for exemptions under the 44-hr.-week law on Nov. 16, on grounds that seasonal demands would not permit strict adherence to the law.

W. H. Klein, vice-president and general operating manager of the Pennsylvania-Dixie Cement Corp., asked exemptions to permit the company to work six hours a day for six days a week. He also asked for exemption of packers during rush season to enable them to have a full year's work.

F. A. Weibel, representing cement salesmen, told the board that it would be impossible to confine salesmen to strict interpretation of the law because of "the very nature of their work."

Australian Cement Men Making Tour of U. S. A.

Two officers of the Commonwealth Portland Cement Co. of Australia are spending four months in the United States making a tour of Portland-cement plants and outstanding construction projects. They are John Corderoy and James Saville. The Australians are particularly interested in the manufacture of dry ice as a cement-plant by-product and are making some investigations of outstanding American installations while *en route*.

"Tip" Brown in Demand Before Lecture Groups

In considerable demand by chambers of commerce, Rotary clubs and other civic organizations is F. T. (Tip) Brown, district sales-manager at Kansas City for the Lehigh Portland Cement Co., because of his inspiring lecture, "Lifting the Face of Main Street". His lecture points out the assets accruing to any community when it improves its main street by paving or resurfacing and by remodeling its business structures.

Erratum

In an article *Ferrari's "Universal Cements"* by Dr. Hans Kühl, published on pages 59 to 63 in the November issue of PIT AND QUARRY, the symbols "C_2S" and "C_3S" were inadvertently used in a few instances in referring to dicalcium silicate and tricalcium silicate. The correct symbols, of course, are C_2Si and C_3Si.

Reclamation Bureau Buys Coulee Dam Equipment

The contract of the M. W. A. K. Co., builders of Grand Coulee Dam, carried a proviso that the Bureau of Reclamation could acquire, at prices stipulated by the contractor in his original bid, the concreting plant, the aggregate plant, the transmission line and the contractor's camp. The Bureau has announced that it is exercising that option.

For $100,000, the Bureau is acquiring both the Eastmix and Westmix concrete plants, the aggregate plant and the 48-in. belt conveyor system, 5965 ft. long, which carries aggregate to the mixing plants. This equipment has demonstrated capacities above 15,000 cu. yd. per day; 415,000 cu. yd. were poured in one month. It also includes the 3400-ft. suspension bridge which carries a 36-in. conveyor belt across the Columbia river to Westmix.

Incidentally, up to Nov. 1 this plant had produced 4,141,000 cu. yd. of concrete, leaving about 391,000 cu. yd. to go.

Slag Producer Enters Silica-Sand Business

The Mohawk Silica Corp. has been formed as an affiliate of the Birmingham Slag Co., Birmingham, Ala. and work has been started on a new silica plant near Mohawk.

Completion has been set for January 1, according to C. B. Ireland, vice-president of the slag company, who is in charge of the new project.

Miners File Claim on Colorado Properties

THOUSANDS OF ACRES INVOLVED

More than a score of mining claims involving approximately 2,000 acres of land have been filed at Las Animas, Colo., following the recent discovery of large deposits of fullers' earth and colloidal clay near there. Deposits of the minerals are said to extend through about 35,000 acres in three southern Colorado counties.

A company has been formed to develop the properties in Bent and Las Animas counties. Directors of the new company are Loren D. Root, Herman A. Bailey, both of Las Animas, and Walter L. Barger and Victor N. Root of Denver. The company has obtained leases on large areas in the counties where the deposits are located, and the work of developing the properties on a commercial basis is expected to start early in 1938.

Cuts Quarry Costs

The West End Chemical Co., Oakland, Cal., produces lime, its quarry and plant being located in San Bernardino County. According to H. D. Hellmer, general superintendent, the installation of Dempster Dumpsters in its quarry has been highly successful, effecting a labor saving of 20 per cent., or enough to pay for the installation within a year. The above photos, from top to bottom, show (1) quarry workers loading the stone into the skips, (2) truck with a skip-load of stone, and (3) dumping a load into a hopper for transportation to the kilns.

MIDWESTERN AGSTONE PRODUCERS HOLD MEETING AT HOOSIER SPA

French Lick, Ind., was the meeting place of 17 limestone producers on November 12 and 13, when they gathered there for the annual convention of the Midwest Agricultural Limestone Institute. E. J. Krause, president, J. L. Fay, vice-president, and G. H. Hart, treasurer, were re-elected for the new year. J. R. Bent was elected secretary. The new board of directors includes E. J. Krause and G. H. Rippetoe (Southern District), Dan Sanborn (Central District), J. L. Fay and H. A. Clark (Northern District), Charles F. Meyer (Eastern District), and E. S. Lockhart (Western District).

Some opinions in favor of the institute's taking a larger part in the Illinois State Fair in 1938 were expressed, but it was felt that, if such participation is decided on, each exhibiting producer should have a separate exhibit instead of only a part of an institute exhibit. Quality analyses of different agricultural limestones and the desirability of fixing quality standards and price brackets as guides to buying were discussed, but no action was taken.

Discounts to farm bureaus were a subject of great interest, and a plan of treating these bureaus as dealers, formulated and discussed by Messrs. Sanborn and Fay, won general commendation. This plan seemed to overcome some of the objections to widely different practices now in use by different producers, in that it placed the bureaus in the same class as dealers in the matter of selling prices, discounts (trade and cash), etc., and removed the Illinois Retailer's Occupational Tax difficulty. The Illinois Agricultural Assn., through John R. Spencer of its soil-improvement department, is attempting to obtain for farm bureaus a higher discount than is given to dealers.

Professor Linsey of the University of Illinois said that the state's present use of agricultural limestone, amounting to but 1,500,000 tons yearly, is so low that the plant-food values of the soil will be exhausted in 50 years unless at least double that quantity is used. One big problem encountered in attempting to increase the use of agricultural limestone is that of financing. Selling pressure is needed in addition to the educational work being done; group selling by trainloads, direct-by-mail advertising, motion pictures are good. The possibility of Federal land banks insisting on liming of the lands on which loans are made was also discussed, Mr. Bent suggesting that farm land left improductive (idle) for improvement by liming should be exempted from taxation dur-

ing that period. He said that the Mississippi River is taking 2,000,000 tons of lime from Illinois land each year by leaching and that this must be replaced.

Chairman Krause appointed a committee of three—Messrs. Bent, Clark and Sanborn—to work with Professor Linsey on methods for stimulating the use of limestone.

It was decided to solicit memberships in the institute at three different annual rates—$10, $15 and $25—allowing the prospective member to choose the grade to which he would belong according to the size of his business.

Mr. Krause suggested that consideration be given to the use of professional truckers to solicit orders for limestone. These men would deliver the stone to the farmers and even spread it on their lands, as a number of them are now doing. Many truckers, however, are irresponsible.

The Peoria Steel & Wire Co., Peoria, Ill., exhibited an improved type of limestone spreader which can be sold by limestone producers to truckers or others selling limestone to farmers.

The following persons were present:

PRODUCERS

J. R. Bent, Dolese & Shepard Co., Chicago, Ill.
E. H. Bills, Moulding-Brownell Corp., Sheffield, Ia.
W. N. Carter, National Stone Co., Joliet, Ill.
H. A. Clark, Consumers Co., Chicago, Ill.
J. L. Fay, Moulding-Brownell Corp., Chicago, Ill.
G. H. Hart, Newton County Stone Co., Kentland, Ind.
H. M. Hollingsworth, Ohio Indiana Stone Co., Indianapolis, Ind.
Robert J. Hummel, National Stone Co., Joliet, Ill.
N. E. Kelb, Ohio Indiana Stone Co., Greencastle, Ind.
E. J. Krause, Columbia Quarry Co., St. Louis, Mo.
E. S. Lockhart, Marblehead Lime Co., Chicago, Ill.
H. H. Marsh, Lehigh Stone Co., Kankakee, Ill.
Charles F. Meyer, Jr., Midwest Rock Products Corp., Indianapolis, Ind.
D. D. Pickett, Lehigh Stone Co., Kankakee, Ill.
G. H. Rippetoe, Anna Quarries, Inc., Anna, Ill.
Dan Sanborn, Lehigh Stone Co., Kankakee, Ill.
E. D. Van Cleave, Ohio Indiana Stone Co., Indianapolis, Ind.

GUESTS

E. P. Kastien, Peoria Steel & Wire Co., Peoria, Ill.
C. M. Linsey, University of Illinois, Urbana, Ill.
Stanley A. Phillips, PIT AND QUARRY, Chicago, Ill.
Nathan C. Rockwood, *Rock Products*, Chicago, Ill.
John R. Spencer, Illinois Agricultural Assn., Chicago, Ill.

Lime-Putty Plant Being Built at New Orleans

To round out its complete service to the building industry at New Orleans, La., Jahncke Service, Inc., producer of aggregates and ready-mixed concrete and dealers in general building supplies has recently installed a Brooks-Taylor lime-putty plant.

The installation, a standard two-tank plant, will be served by the concrete trucks, sanded mortar being delivered to the job after mixing while enroute, the lime-putty and sand being charged at the plant. Dump trucks may also be employed for premixed material.

The plant, fabricated at the Birmingham, Ala., works of the Chicago Bridge & Iron Co., was shipped Nov. 19 and scheduled to go into operation early in December.

Safety Congress Back to Chicago for 1938

The 1938 National Safety Congress will be held in Chicago October 10-14. The entire Stevens Hotel will be used for the Congress.

Next year is the Silver Jubilee year of the National Safety Council and the Council thus brings its biggest Congress to a city which saw the Council start with two men and a tiny office 25 years ago and grow to national importance.

Former Cement Employee Wins Suit for Damages

The Oklahoma Supreme Court has affirmed a $3,000 judgment against the Oklahoma Portland Cement Co., Ada, Okla., in favor of P. A. Pollock, now 65 years old.

According to the evidence Mr. Pollock was injured in 1918 while at work at the cement plant. According to his complaint he was promised a lifetime job provided he took no action seeking compensation for his injuries. He was dismissed from his work in 1931, however, and later brought suit against the cement company.

Fire Destroys New Clay Plant at Paris, Tenn.

The buildings and machinery of the Tennessee Bleaching Clay Corp. at Paris, Tenn., were destroyed by fire of undetermined origin on Nov. 15, causing a loss of $25,000. The plant was opened last February and a description of the operation was published in the November, 1937 issue on page 34.

1938 Construction to Match 1937 Record

RISE IN HOME BUILDING SEEN

Privately-financed building and engineering work in 1938 should approximate the same volume as this year, according to Thomas S. Holden, vice-president of F. W. Dodge Corp., in a statement on the construction outlook just made public. However, publicly-financed work is likely to continue its decline, resulting in a moderately reduced total volume of construction next year.

The Dodge estimates indicate that 210,000 to 220,000 new family dwelling units are likely to be built in the entire country next year, compared with an estimated 185,000 to 195,000 in 1937, and 160,000 in 1936. This moderate increase in residential building is likely to be accompanied by a volume of commercial building approximately the same as this year's, and declining volume of factories and public and institutional buildings. While combined moderate increases in residential building and moderate decreases in non-residential building would give a total building volume about equal that of 1937, heavy engineering work is also likely to decline somewhat, resulting in a net decrease in total building and engineering volume.

The current recession in building has, to date, been quite moderate in character, having consisted principally in declines in publicly-financed work. Privately-financed building, both residential and non-residential, continued to run ahead of last year's volume right through the middle of October. During the first nine months of 1937, private construction of all kinds in the 37 eastern states reached a total of $1,436,994,500, which was 46 per cent. ahead of the figure for the corresponding period of 1936, while public building and engineering work has declined 18 per cent. from last year.

Expectations of a large and rapid boom in residential building were not justified at any time this year, nor are they justified in anticipation for next year, according to the Dodge Corp. analysis of the situation. Estimates of housing requirements running from 500,000 to 1,000,000 family units a year represent social needs; they do not represent an economic demand at the present stage of partial business recovery. They probably can not be translated into economic demand in a period of rapidly rising costs, but will only be realized on a broad scale by

OPERATES DIESEL TRUCK FLEET

The Worden Sand & Gravel Co., Bedford Hills, N. Y., operates a fleet of four Diesel-powered trucks which are again proving the economy of this type of motive power. Where $5.00 worth of gasoline was formerly required to drive these trucks a given distance, the total fuel cost using the Diesels is only $1.17 for the same distance. Each of the trucks has a capacity of from 7½ to 10 tons of material. Two are Ward LaFrance models, one a Sterling, the other a Mack. All are driven by Cummins Diesel engines.

such future improvements in home-financing and home-production as will definitely provide better houses at lower costs than at present.

Two important factors are customarily overlooked in most current appraisals of construction industry prospects: Urban population growth in the first half of the current decade was at the rate of 400,000 new persons annually, compared with 1,400,000 per year in the 1920's, according to estimates recently made public by the National Resources Committee. Old-fashioned speculative building booms, of the kind anticipated in predictions widely publicized during the past twelve months, have practically always been stimulated by urban and suburban population growth. The second factor is that there is at this moment no great expanding industry, like railroads and automobiles in the past, to stimulate general economic expansion on a broad front and generate the greatly increased purchasing power necessary for a big building boom on rising construction costs. Careful appraisal of the current rises in business and building volume indicates a period of recovery from depression, but not necessarily, as yet, a period of general industrial expansion.

Next year, as viewed by Mr. Holden, will probably be neither one of serious recession nor of very rapid recovery progress, almost certainly, not a boom year. It will most likely prove to be a year of consolidating and stabilizing recovery gains, with a slow start in the first quarter, and the probability of definite improvement somewhere around the middle of the year.

Wisconsin Road Builders Ask Uniform-Price Code

Wisconsin highway contractors almost unanimously voiced a demand for the re-enactment of a code for their industry at a hearing conducted before the state fair-trade practice commission at Madison on Nov. 16.

The proposed code sets standard prices in the cost of materials and items making up bids for contracts, regulates trade practices, and provides for minimum wages for workers.

Produce Marble Chips at New Georgia Plant

A new industry for Georgia using hitherto undeveloped deposits of colored marble in northwest Georgia has been announced by Richard W. Smith, director of the Georgia division of mines, mining and geology.

Mr. Smith said one of the largest producers of marble chips for use in terrazzo, now operating at several points in Texas, will soon start a quarry and crushing plant in north Georgia, and is examining other deposits in the same section.

Urge Diversion of Road Funds Cease in Iowa

Thirty-four members of the Iowa Petroleum Industries committee in a meeting at Des Moines on Nov. 8 asked for a constitutional prohibition of diversion of motor taxes to purposes other than road building and maintenance.

State Treasurer Leo J. Wegman, administrator of the gas tax law, in addressing the committee, said that he would oppose any effort to divert gas tax revenue from highways.

Expects Bright Year for Machinery Makers

F. O. WYSE FETED AT BANQUET

Business recession or no, prospects for the construction equipment industry are the brightest in years, Col. Willard Chevalier, president of the American Road Builders' Assn., declared in an address at a dinner of the Milwaukee Assn. of Industrial Advertisers in honor of Frank O. Wyse, advertising manager, Bucyrus-Erie Co., who is the new president of the National Industrial Advertisers' Assn.

If there is a turn for the better, business optimism will boom highway construction anyway, he said. If the recession continues, the government will step up highway construction in a strong effort to reverse the trend, he believes.

An indication is the fact that industry's convention and show in Cleveland in January will be the largest since 1930, Col. Chevalier said. Both attendance and exhibits will exceed the figures for that year, which marked the boom peak. Manufacturers, contractors, engineers and public officials will attend from all parts of the country in greater numbers than ever, he declared.

A principal reason for the bright outlook is the increased interest in reconstructing highways along safety lines. Hitherto education of drivers and law enforcement had been stressed by safety experts. Now, said Col. Chevalier, they realize they must "engineer more safety into the highways to begin with." Consequently roads which were "the last word 15 years ago" are now recognized as utterly inadequate.

Lime Company Salvages Barge Sunken in River

A steel barge 510 ft. long, leased by the Mississippi Lime Co. from the Missouri Portland Cement Co., which sank in the Mississippi River some time ago, has been raised and salvaged by the lime company.

Opens Sand-and-Gravel Plant at Yakima, Wash.

The Leo S. Ross Construction Co. of Yakima, Wash., has started production at its recently-completed sand-and-gravel plant. H. O. Whited is superintendent and the capacity of the operation will be about 120,000 cu. yd. annually.

National Crushed Stone Assn.
National Lime Assn.
National Slag Assn.
Portland Cement Assn.

WITH THE TRADE ASSOCIATIONS

National Sand & Gravel Assn.
National Industrial Sand Assn.
National Ready Mixed Concrete Assn.

DECEMBER, 1937

P. C. A. Elects Hogan Chairman of Board

Members of the Portland Cement Assn. gathered at the Blackstone Hotel in Chicago on Nov. 29, 30 and Dec. 1 for the annual meeting of the organization.

Charles L. Hogan (Lone Star Cement Corp.) was elected chairman of the board and S. W. Storey (Consolidated Cement Corp.) was named treasurer.

Directors for three years were elected as follows: Joseph Brobston (Hercules); W. A. Davis (Standard); J. B. John (Medusa); V. N. Roadstrum (Pennsylvania-Dixie); A. J. Rooney (Huron).

Directors for one-year: Moss Alexander (Missouri); Charles Boettcher (Oklahoma); E. P. Lucas (Superior); L. C. Newlands (Oregon).

Industrial Sand Assn. to Convene at Zanesville

At the semi-annual meeting of the board of directors of the National Industrial Sand Assn., held in Chicago on October 5, it was decided that the third annual convention of the association shall be held in Zanesville, O., as a compliment to E. M. Ayers, president of the Ayers Mineral Co., Zanesville. Mr. and Mrs. Ayers will next May celebrate their fiftieth wedding anniversary. The specific dates of the convention will be announced later, but it will probably be about the second week of May.

Among several questions considered by the board was that of expansion of the list of active member companies. It was agreed that the most effective work in this regard could be done by executives of companies already affiliated with the association.

A progress report of the research committee was submitted at the board meeting, and approved as amended for distribution among the membership. A further subject of discussion was the question of labor relationships in the industry, and Executive Secretary V. P. Ahearn was instructed to make available to the membership copies of contracts with labor organizations recently signed by two member companies, together with appropriate comments thereon.

N. C. S. A. Mail Stickers to Boost Convention

The National Crushed Stone Assn. has inaugurated an unusually intensive campaign to stimulate attendance at the annual convention and exposition, which will be held in Cincinnati on January 24-26, 1938.

The association has had prepared a convention sticker. These stickers will be affixed to all mail going out from the association office and the coöperation of members of the Manufacturers' Division in placing stickers on their mail is also being obtained.

Coming Events

January 17-18, 1938, San Antonio, Tex. — Annual convention, American Concrete Pipe Assn., Plaza Hotel.

January 17-22, 1938, Cleveland, Ohio. — Annual Road Show, American Road Builders' Assn., Cleveland Auditorium.

January 24-26, 1938, Cincinnati, Ohio. — Twenty-first annual convention and machinery exhibition, National Crushed Stone Assn., Netherland Plaza Hotel.

February 1-3, 1938, Cincinnati, Ohio. — Twenty-second annual convention and machinery exhibition, National Sand & Gravel Assn., Netherland Plaza Hotel.

February 1-3, 1938, Cincinnati, Ohio. — Annual convention and machinery exhibition, National Ready Mixed Concrete Assn., Netherland Plaza Hotel.

February 7-8, 1938, Chicago, Ill. — Annual convention, Cast Stone Institute, Sherman Hotel.

February 8-11, 1938, Chicago, Ill. — Annual convention and machinery exhibit, American Concrete Contractors' Assn. and National Concrete Masonry Assn., Sherman Hotel.

S. & G. Assn. Makes New Research Arrangement

The National Sand & Gravel Assn. has made an arrangement with the College of Engineering of the University of Maryland for the conduct of research at the university. Testing equipment which is now in the laboratory of the association in the Munsey Building, Washington, D. C., will be removed to the university at College Park, Md., only a few miles from Washington. The research work started by the association when its laboratory was established in 1928 will be continued at the university. The new arrangement provides for the National Sand & Gravel Assn. Research Foundation, which will be operated by the association with its activities subject to the approval of a joint advisory committee on which the university and the association will have equal representation. The dean of engineering, S. S. Steinberg, has a broad background of experience and a sympathetic understanding of problems of the nature of those which the Foundation will investigate. Dean Steinberg will serve as one of the university's representatives on the joint advisory committee. Stanton Walker, director of engineering of the association, will be a member of the joint advisory committee and the work of the Foundation will be directed by him.

Space in the engineering building of the university has been made available for the work of the Foundation and additional space will be provided from time to time as conditions require. Under the arrangement, the university will have the privilege of using much of the association's equipment and the association will have the privilege of using much of the university's equipment. The association's equipment is to be moved to the university during

the current year and the operation of the foundation will be started Jan. 1, 1938.

The Research Committee of the association, of which Alexander W. Dann is chairman, already has outlined a number of problems to be investigated and a detailed report in that regard will be presented at the forthcoming twenty-second annual convention of the association. Illustrative of the subjects being given prominent consideration by the Research Committee are:

1. Adhesion of bitumens to aggregates of different mineral composition and surface texture.
2. Stability and durability of bituminous mixtures as affected by shape of aggregate particle.
3. Fatigue of concrete subjected to repeated impact and static loads as affected by characteristics of aggregate.
4. Identification of aggregate particles considered harmful to the finished product and methods for evaluating their effects.
5. National survey of aggregate characteristics to provide bases for specifications in different localities.

The establishment of the Foundation makes available to the association more equipment and better facilities for its investigational work than it has had heretofore. It also provides an opportunity for the university to increase the scope of its engineering research. It is earnestly believed that the arrangement will work to the mutual benefit of the university and the association. A further advantage is that the association will be in a position to keep in closer touch with the industrial minerals researches of the U. S. Bureau of Mines, which are centered at the Eastern Experiment Station of the Bureau located on the campus at College Park.

Schedule Speakers for Cincinnati Convention

A meeting of the executive committee of the National Crushed Stone Assn. was held in Washington on Nov. 9 with the following in attendance:

H. E. Rodes (Chairman), Stirling Tomkins, Otho M. Graves, T. I. Weston, Russell Rarey, A. L. Worthen.

The meeting was devoted largely to a discussion of arrangements for the forthcoming convention. It was brought out that the following talks have been definitely scheduled:

What is the Future of Private Enterprise?—Donald D. Conn, executive vice-president, Transportation Assn. of America.

Ground Vibration from Quarry Blasting—J. R. Thoenen, consulting mining engineer, U. S. Bureau of Mines.

The Effect of Economic and Social Changes on Cost—A. D. Berning, resident partner, Ernst & Ernst, New York, N. Y.

Diesel Power in the Crushed-Stone Industry—Lacey H. Morrison, editor, *Diesel Power* & *Diesel Transportation*.

The concluding session of the convention will be largely devoted to a discussion of labor relations in the crushed-stone industry and to a report on Federal wage-and-hour legislation to be submitted by a special committee headed by Otho M. Graves.

N. L. A. Activities

Lee S. Trainor, head of the construction department, National Lime Assn., presented a paper on "Some Aspects of the Use of Hydrated Lime in Portland-Cement Concrete" before the annual meeting of the New York and New England Highway Testing Engineers in Boston, Mass., November 17, 1937.

The following schedule has been arranged for a series of meetings with architects, engineers, and builders, sponsored by the National Lime Assn. in the South:

Dec. 6, Miami, Fla., Columbus Hotel, 12:30 p.m.
Dec. 8, Birmingham, Ala., Thos. Jefferson Hotel.
Dec. 9, Atlanta, Ga., Henry Grady Hotel.
Dec. 10, Charlotte, N. C., Charlotte Hotel.

A complimentary luncheon will be tendered the guests at each gathering, after which Walter C. Voss, professor of building construction, Massachusetts Institute of Technology, will speak on "Why Masonry Walls Leak." Prof. Voss is the outstanding authority on masonry construction in the United States and has a message of vital importance to all who design, build, own or operate buildings. Member companies located in the territory in which those meetings are scheduled are urged to attend one or more of them.

Technical Developments Keep Goldbeck Busy

Several diverse lines of activity have engaged the attention of A. T. Goldbeck, engineering director of the National Crushed Stone Assn, during the past month.

In Washington a conference was held in connection with specifications for size of aggregate to allow for the differences in results obtained with two different sieves, both of them conforming with the present sieve standards.

In New York state a number of stone producers this past year were required to furnish, for bituminous concrete mixtures, a large percentage of their output graded between the $\frac{1}{8}$ in. and $\frac{1}{4}$ in. screens. This resulted in high production expense and considerable waste. A conference in an attempt to relieve this situation was had with the proper highway officials.

A paper was presented in Boston before the New York and New England testing engineers' annual meeting on *The Relation of the Los Angeles Rattler Test to Service Value of Aggregates*. This paper was based on tests of the association. At the same conference coöperation was given to the testing engineers in a further attempt to bring about the standardization of sizes in the New England States.

An interesting meeting of the Massachusetts Stone Producers Assn. was attended. Conferences were also held with the Massachusetts Department of Public Works in connection with specification matters.

Ohio Burial-Vault Men Gather at Columbus

The Ohio Concrete Burial Vault Assn. held a two-day meeting at Columbus, O., recently.

A feature of the gathering was a demonstration of making quick-hardening concrete, sponsored by the Vacuum Concrete Corp., New York, N. Y. Assisting was A. M. Lendrum, president of the Norwalk Vault Co., Norwalk, O., whose firm is said to have been the first to adopt the process for vault manufacture.

The election of officers resulted in the choice of Lowell K. Huber for president, Wm. Fithian for vice-president and E. C. Jefferies for secretary-treasurer. The Board of Directors will consist of these and the following: G. H. Blackstone, A. M. Lendrum, R. P. Hilles and J. H. Stuart.

The attendance demonstrated the enthusiasm of the concrete-vault manufacturers for taking hold of legislative problems and the desire of every operator to avail himself of the latest methods in manufacturing specification vaults of accredited materials.

About 30 have joined the association and letters from others of the industry who were not able to attend indicate that this number will be considerably increased before the end of the year.

EDITORIAL

The Regulation of Hours and Wages

THERE is really nothing novel in the principles underlying the proposed wages and hours legislation now before the Congress, despite popular notions to the contrary. These two features of working—the rate at which work shall be compensated and the period through which it shall be done—have been the subjects of religious and temporal rule-making throughout historic times. They have long been recognized as of great social importance, although attitudes toward them and the methods proposed for their solution have varied with the times.

As long ago as 1270 the French had minimum-wage laws, and legislation fixing maximum rates of pay, enacted in England in 1357 and again in 1536, remained in force until repealed in 1813. For more than a quarter of a century in our own country the protection of helpless and unorganized groups through government-enforced wage laws has been actively debated, and, although always assailed on constitutional grounds, the proposals culminated in the passage of minimum-wage laws for women and children first in Massachusetts in 1912 and subsequently in fourteen other states, the District of Columbia, and Puerto Rico. The traditional American attitude of skepticism regarding the effectiveness of government intervention in matters that are considered of interest only to the parties concerned—employers and employees—has made even strong trade unions oppose minimum-wage legislation largely on the ground that it would lessen the chances of increasing membership by removing one of the chief objectives of trade-union existence.

TRADE unions which have advocated government regulation of wages to the extent of prescribing certain minima have sought to standardize minimum earnings as a means of protecting the worker's standard of living. The minimum rates are believed to be useful not alone in preventing wages from falling too low but also as a method for eliminating wage-depressing competition between unemployed workers. Naturally there has been little agreement as to what the minimum rate should be, whether a living wage based on determined cost-of-living standards, a fair wage equal to that paid to other workers showing equal skill and performing similar or equally difficult or unpleasant work, or a wage that the industry affected can afford to pay.

This problem of what constitutes the proper basis has perplexed regulating boards, which have been charged with the duty of deciding on an equitable plan, as well as the legislators, who have frequently avoided the adoption of a definite figure or a definite basis for decision in order to escape the political consequences of an unpopular act. The living wage, with wage boards set up to determine it, is the method adopted in most of the American states, in Canadian laws, in Western Australia and in New South Wales, while the fair wage has won the favor of most of the countries of Europe which have laws regulating homework.

ANY wage minimum calculated on the living-wage criterion is subject to fluctuation occasioned by changes in the commodity prices which determine the cost of living. It must, therefore, be revised from time to time as the upward or downward movement of the commodity-price index indicates, but what index should be used and how frequently adjustments should be made are problems that are still unsolved. A family-allowance system, such as that adopted in New Zealand and New South Wales, seems to be a practical way out of the difficulties encountered in trying to make a uniform rate applicable to workers having different numbers of dependents. The ability of an industry to pay the rates fixed either by law or by the boards acting under it has presented problems, which have been met in some cases by the argument that an industry which can not pay a living wage should cease operations or, if its product is necessary in the national economy, be subsidized from public funds.

The fair-wage criterion has been fully as difficult to apply, because many factors and conditions other than wages must be considered. The relationship between the duties, hazards and earnings of those engaged in skilled occupations and those who are unskilled has raised problems, which have altered with each change in the demand for each kind of labor and the generally rising level of unskilled wages.

No less complicated is the proposal to base wages on the ability of an industry to pay them, since this involves problems of deciding what constitutes that industry and at what size it should be maintained. The proposal to extend the "ability-to-pay" test to industry in general would seem to remove some of the difficulties of arrang-

ing for each industry separately, and incidentally placate the "uniformists", but even here it is hard to know what standard to adopt in estimating that ability.

THE introduction of expensive machinery was probably the chief cause of lengthening the working day. Factory owners naturally wanted to obtain the maximum output from their new equipment and the most obvious method lay in longer hours for their operatives. Artificial lighting made night operation possible and this increased the desire to make the hours of human labor approach closely to the maximum work capacity of the machine. Independent workers, such as handicraftsmen, were stirred by machine competition to work longer hours, and women and children were pressed into service and worked as many hours as men. Fourteen hours constituted an ordinary day's work, and sixteen-hour days were not sufficiently uncommon to cause comment. By 1880 trade-union action in England had succeeded in shortening the work-day to nine hours, compared with a ten-hour day in other industrial countries. In some industries, such as steel in America, the twelve-hour day prevailed up to within the last two decades and was then eradicated only by the combination of trade-union effort and an aroused public sentiment. Current opinions find expression in such movements as that for the thirty-hour week, which is held by some to provide the answer to our present problems of reducing unemployment —technological, as well as "normal", seasonal and cyclical—and of increasing mass purchasing power.

Material or other interests and prejudices will usually determine what attitudes different people take, in the absence of scientific data, to any proposal to shorten or fix by legislative fiat the number of hours during which anyone may work in a given period of time. The worker will naturally strive to reduce the number of his working hours without lessening his total earnings in order to save energy, to make work available for unemployed fellow workers, and to obtain more leisure. The employer, just as naturally, will oppose such contemplated reductions and will, indeed, favor increasing the number of working hours without increasing the total wages bill in order to lessen the labor cost per unit of product, to simplify the problems of labor management, the arrangement of shifts, and the like, and to discourage the growing assertiveness of the working group. The government, interested for many reasons (in addition to military considerations) in maintaining public health at a high level, will adopt such means as appear necessary to foster a high sense of citizenship, to eliminate or reduce employment, to distribute over larger sections of the population an easier taxpaying ability, to provide economic conditions favorable to profitable and taxable production, and to prevent social upheavals that may endanger public institutions. The first two of these attitudes are prompted by a desire to protect individual, personal or group interests; only the third can be held to be prompted by a concern for the public good.

These attitudes may be thought of as somewhat similar to the three aspects of the hours-of labor problem as enumerated by the German writer, Otto Lipmann, some years ago, when he described them as cultural, economic, and hygienic. A working day of maximum cultural value can not, in his opinion, be specifically limited. A working day of maximum economic value is the one which produces the maximum daily output. A working day of maximum health value is the one which provides the worker with sufficient rest and sleep to restore completely the energy expended in completing the day's work. As the result of his studies he concluded that there is no optimum economic working day for all workers, all factories, all industries, or all countries. He pointed out, too, that in many industries a shorter working time would probably be nearly the same as the optimum economic time, and that longer working time, even where it appears to be economically profitable, will not be so unless workers are rewarded with higher wages for their greater work capacity and willingness to work.

A PROMINENT American manufacturer, Henry Ford, has argued for the economic soundness of shorter working time because of the additional leisure which it would provide for the enjoyment of the commodities produced by workers, thus adding modern confirmation to the view expressed by Ira Stewart seventy-two years ago, when he said, in pleading for the eight-hour day, " . . . men who labor excessively are robbed of all ambition to ask for anything more than will satisfy their bodily necessities . . ." Stewart contended that shortening the working time would increase the desire for commodities and so stimulate the production of them. Such a reduction in the hours of labor would insure a better balance between production and consumption, in the opinion of its advocates, because, as was stated in the report of President Hoover's Committee on Recent Economic Changes in 1929, "people can not 'consume' leisure without consuming goods and services, and" . . . "leisure which results from an increased man-hour productivity helps to create new needs and new and broader markets."

Bellamy Sand & Gravel Co. plant. Gold-reclaiming flume is at left.

Gold in Iowa? Sand-and-Gravel Plant Recovers It from Waste!

By W. E. TRAUFFER

Looking up the conveyor at the plant. Scrubber at left; classifiers at right.

THE new sand-and-gravel plant of the Bellamy Sand & Gravel Co., near Correctionville, Ia., was built to supply the demand for aggregates in a territory which could not be economically served by the nearest existing plants. This plant, located two mi. south of Correctionville on the Little Sioux River, has a capacity of about 100 tons per hr. of gravel and the same amount of sand. It was designed by the Link-Belt Co., which supplied most of the equipment. The plant went into operation on April 30, 1937 and has run steadily since. For several months during the summer it was operated day and night.

The plant is owned by H. D. Bellamy, his two sons and a daughter in partnership. Mr. Bellamy is president of the Concrete Materials Corp. of Waterloo, Ia., which operates five sand-and-gravel plants in Iowa and Illinois. This new plant is in no way connected with the Concrete Materials Corp., but is a private venture of this family in a territory out of the normal sales areas of any of the Concrete Materials Corp. plants. Howard J. Bellamy is plant superintendent and Fred E. Bellamy is sales manager of the Bellamy Sand & Gravel Co. Both make their headquarters at the main office of the plant. A sales office is also maintained in Des Moines, where H. D. Bellamy resides.

The plant was built primarily to supply aggregates for concrete highways and bridges in the western part of Iowa. Jobs as much as 70 mi. away have been supplied by railway from this plant. Ballast sold to the Illinois Central Rwy. has been shipped as far as 300 mi. A large amount of material is also sold to dealers and for private building construction.

The deposit consists of 320 acres in the flood plain of the Little Sioux River. The overburden averages 3 ft. in depth and the sand-and-gravel deposit averages 20 ft. of suitable material over a bed of sand and clay. Two P & H No. 700 gasoline crawler drag-lines are being used to excavate both the overburden and the sand and gravel, the latter being loaded into cars for haulage to the plant. One drag-line is equipped with a Page 1½ cu. yd. automatic quick-dump drag-line bucket and the other has a 1½-cu. yd. Omaha bucket.

An interesting method of operation has been developed. The drag-lines travel in separate paths parallel to and on the same side of the track. The area farthest from the track is stripped ahead by both drag-lines in spare time, the overburden being deposited on the ground already worked out. When the plant is operating, one drag-line travels on this strip, excavating the gravel behind it as it goes and loading it into cars. The other drag-line travels on the strip nearest the track, trailing behind the first drag-line. This machine removes the overburden from this strip and deposits it in the area excavated by the first drag-line. The sand and gravel in this strip are then loaded into the same cars. This method of operation is so well timed that both machines work along steadily with little lost time and without interference to each other.

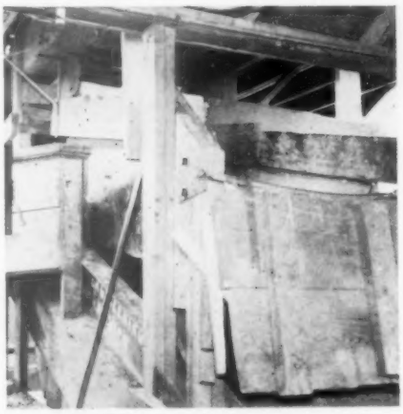
Flume lined with long-nap carpeting which recovers gold from the wasted fines.

The sand and gravel are loaded into two 30-cu. yd. hopper-bottom cars, one on each end of a 14-ton Plymouth gasoline locomotive. Each car is covered with a 9-in. bar grizzly sloping to both sides. This rejects the few bowlders too large for the primary crusher. At present the material is being hauled about 1,200 ft. to the plant, where it is discharged from the cars into a 75-cu. yd. track hopper. This hopper is of wooden construction with concrete foundations and walls and is large enough to insure a steady feed to the plant even when operations are being

The revolving screen and scrubber with vibrating screen above.

conducted much farther from the plant.

A Link-Belt reciprocating feeder discharges the sand and gravel on a 24-in. by 180-ft. belt-conveyor (No. 1) which carries them to the 4-ft. by 6-ft. Simplicity single-deck vibrating screen. This is usually equipped with 2-in. wire cloth. The gravel retained on this screen is discharged on a Link-Belt shaking picking table, 30-in. wide and 12 ft. long, which thoroughly agitates the material and turns it over, thus greatly facilitating the picking operation. This shaking picking table is an adaptation from coal-tipple practice and, so far as is known, is entirely new to gravel-plant operation. One man is stationed at the table to remove the small amount of iron oxide found in this deposit. The gravel is discharged from the picking table into a Worthington Size 13 gyratory crusher which usually crushes it to 2 in. and under. The crusher product is discharged on a 20-in. by a 96-ft. conveyor (No. 2), which returns it to the first conveyor for rescreening. The material passing through the scalping screen is carried to the screening building on a 24-in. by 140-ft. belt-conveyor (No. 3). When concrete bridge gravel is being



Vibrating screen which scalps coarse gravel, discharging it to the picking table.

produced, 1½-in. wire cloth is used on the scalping screen and the crusher opening is set at 1½ in.

Each of these equipment units is independently driven. The feeder is driven by a 3-hp. motor through gears and the three conveyors (Nos. 1, 2 and 3) are driven through Link-Belt silent chains and gears by 25-hp., 5-hp., and 20-hp. motors, respectively. The screen is driven through V-belts by a 10-hp. motor and the crusher through a flat belt by a 60-hp. motor.

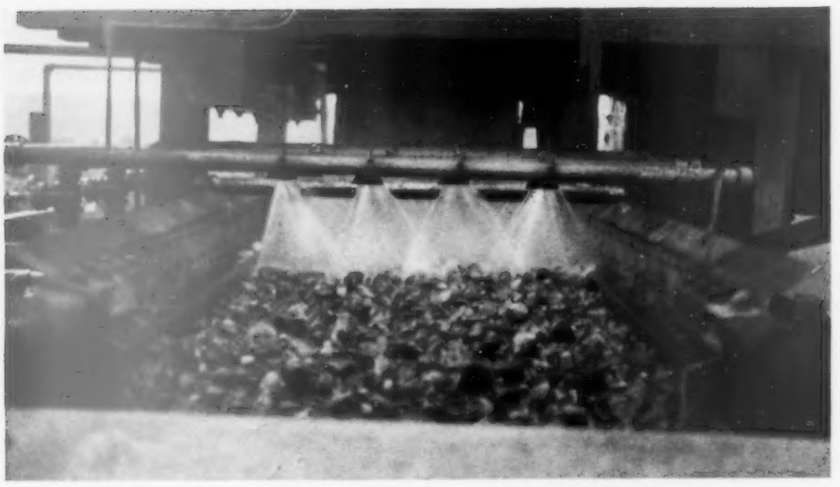
The sand and gravel are discharged from belt-conveyor No. 3 on a 4-ft. by 14-ft. Iowa Mfg. Co. Symons double-deck screen, which is equipped

Floating intake of water supply. Flexible coupling allows for changes in water level.

with Link-Belt spray nozzles. Two sizes of cloth are used on each deck. On the top deck $\frac{7}{16}$-in. cloth is used on the receiving end of the screen and ¼-in. on the discharge end. On the bottom deck $\frac{13}{64}$-in cloth is used on the first 10 ft. and ¼-in. on the rest.

The coarse gravel retained on the top deck of this screen is discharged on a 24-in. by 24-ft. picking conveyor where any remaining iron oxide or spall-producing material is removed. This gravel is then discharged into a bin as 1½-in. or 2-in. paving gravel. The ¼-in. to ¾-in. gravel retained on the bottom deck of the screen is discharged into a Link-Belt 5-ft. by 8-ft. rotary scrubber, from which is passes with the water into a Link-Belt hook-

Drag-line which strips the deposit and excavates the gravel, dumping it into cars.



Vibrating screen with deflector-type spray nozzles which wash the material while it is being classified.

bolt screen, which is 6 ft. long and 53 in. in diameter at one end and 35½ in. at the other. This screen is equipped with ¼-in. perforated plate and sprays for further washing. The fines and water passing through this screen are flumed to waste. The washed gravel can be discharged from this screen through a chute into a separate bin or on a 24-in. by 40-ft. reversible belt-conveyor which can drop it into the paving-gravel, ballast, or mixed concrete-gravel bins.

The sand passing through the $^{13}/_{64}$-in. section of the bottom deck of the Symons screen is discharged into a flume feeding two Link-Belt Shaw classifiers, 30-in. and 36-in. units, placed in series. The product of these classifiers is discharged into the concrete-sand bin. When plaster sand is desired, the product of the second classifier is discharged on a small vibrating screen which removes some of the coarse sand. The plaster sand passing through this screen is discharged into a separate bin. The product of the first classifier can also be flumed into the ballast or mixed concrete-gravel bins when desired.

The 14-ton gasoline locomotive with hopper cars at plant. Note grizzly over the car.

Close-up view of the sand classifiers.

The pea gravel passing through the last 4 ft. of the bottom deck of the Symons screens is discharged on a stock-pile. This material is mixed with sand in loading to form road gravel.

The overflow from the classifiers and some of their product has been wasted through a flume. Tests have shown that the sand and gravel in the deposit contain about 7c. worth of gold per ton. As an experiment a sluice has been installed to reclaim the gold contained in the wasted sand. This sluice is lined with long-nap carpet which is removed and washed several times weekly to remove the accumulated gold.

The wooden storage bin has eight compartments with a total capacity of 750 tons. Cars and trucks are loaded through sliding gates with drop chutes on the sides of these compartments. Trucks are used for local commercial-stone shipments only. A ¾-mi. track connects the plant with the Illinois Central Rwy. All the switching at the plant is done with a second 14-ton Plymouth gasoline locomotive.

The scrubber is driven by a 15-hp. motor through a Link-Belt speed-reducer and gears. The rinsing and picking belt are driven from the same 3-hp. motor and the distributing belt is driven by another 3-hp. motor. Cincinnati Rubber Co. conveyor belting is used exclusively.

Single-stage centrifugal pump which supplies water for washing.

Wash-water is supplied from the Little Sioux River by a Dayton-Dowd 2,500-gal. per min. centrifugal pump driven by a 125-hp. G. E. motor. The 10-in. suction line to this pump is fitted with Goodyear suction hose so that it can be raised or lowered with the river level. The pump has an 8-in. discharge with an expander section to the 16-in. pipe-line to the plant 800 ft. distant. National Tube Co. water pipe is used.

Using the 220-v. a-c. welder to build up a dragline-bucket tooth.

A large and complete repair shop is maintained. Its equipment includes a lathe, a forge, a drill-press, an emery wheel and acetylene cutting and welding sets. An Arc-Weld Co. Arkweld electric welder, using 220-v. alternating current, is used to build up bucket teeth and other wearing parts. This building is also used for the storage of parts and supplies.

Window-Glass Industry Cited by Federal Trade Commission

SUBSTANTIALLY all domestic manufacturers and a large group of distributors in the window-glass industry have been ordered by the Federal Trade Commission to cease and desist from the use of unfair methods of competition in violation of the Federal Trade Commission Act, and from price discriminations held to violate the Robinson-Patman amendment to the Clayton Act.

The order is directed against the Window Glass Manufacturers Assn. and the National Glass Distributors' Assn. and the members, officers and directors of each. Although the order does not name the entire membership of the distributors' association, it is directed against all of them, some 150 in number.

Findings of the Commission are that since about 1935 the respondents have conspired together and adopted and put into effect certain unlawful practices, among which are the following:

(1) Classified all buyers of window glass from the respondent manufacturers either as quantity buyers, defined as those purchasing a minimum of from 3,000 to 5,000 fifty-ft. boxes a year, or as carload-lot buyers; (2) required carload-lot buyers and other buyers to purchase window glass from quantity buyers or from the respondent manufacturers through such quantity buyers; (3) compelled carload-lot buyers and other buyers to pay up to 7½ per cent. more for window glass of the same grade and quality than the price quoted to and paid by quantity buyers; (4) agreed that on sales to carload lot buyers and other buyers the manufacturers were to receive 2½ per cent. and the quantity buyers 5 per cent. of the 7½ per cent. price differential; (5) adopted a policy of precluding two or more dealers from making pooled purchases in carload lots and prevented carload-lot buyers from reconsigning or diverting carloads to other dealers, and (6) refused to sell in carload lots directly to any buyer except approved quantity buyers.

Certain parts of the order are directed against all of the respondents, requiring them to cease and desist from engaging in, pursuant to any combination or conspiracy, the following practices:

(1) Adopting any standard of classification of dealers in window glass to be used as a test of eligibility for such dealers to purchase from the manufacturers; (2) publishing any list of dealers for use by members of the manufacturers' association or other manufacturers for the purpose of accomplishing anything prohibited by the order; (3) collecting or disseminating information concerning the pricing policies, trade practices, facilities or function of any dealer for the purpose of accomplishing anything prohibited by the order; (4) preventing any dealer from freely purchasing window glass usually handled by members of the manufacturers' association, or from freely competing with members of the distributors' association or others engaged in a similar business; (5) hindering dealers from dealing with one or more of the members of the manufacturers' association upon as favorable terms and conditions as usually are accorded by such manufacturers to their customers generally; (6) preventing two or more dealers from pooling, reconsigning or diverting purchases, and (7) entering into any agreement to add any amount to the manufacturer's price for window glass in carload lots for direct shipment in order to arrive at the invoice price.

Under the order, the manufacturers and their association are directed to discontinue collectively selecting the customers to whom they will make direct sales; preventing any dealer from purchasing window glass in carload lots from any manufacturer and directing such manufacturer to ship it to any designated point, and notifying dealers that any business concern is not entitled to purchase window glass upon the same terms and conditions usually accorded by members of the manufacturers' association to their customers generally.

The National Glass Distributors' Assn. and its members are prohibited from compelling certain dealers to purchase window glass from or through other competing dealers, and from assisting or encouraging members of the manufacturers' association collectively to select the customers to whom they will make direct sales in carload lots. The order also requires that the respondent distributors cease persuading manufacturers to charge any dealer more for window glass than the price accorded their customers generally, and that they discontinue inducing dealers to refrain from selling or accepting carload-lot orders for shipment to points outside a certain restricted trade area agreed upon.

As to violation of the Robinson-Patman Act, the respondent manufacturers are ordered to cease and desist from discriminating in price between carload-lot purchasers, to whom shipment is made direct from the factory, by charging some of the purchasers 2½ per cent. more than the price charged other of such purchasers for window glass of the same grade and quality and of comparable strength, sizes and kinds, or any amount more, which would result in discriminatory prices in violation of Sec. 2 (a) of the act.

The respondent distributors are directed to discontinue accepting any discriminating price or the benefit of any discrimination in price prohibited by the order, and to stop inducing manufacturers of window glass to discriminate in price in the manner prohibited.

According to the commission's findings, the acts and practices ordered discontinued tend to concentrate in the quantity buyers the opportunity to purchase window glass at the manufacturers' discount from the list price; to unreasonably lessen and restrain competition in the industry; to increase the cost to purchasers of window glass; to discriminate against small business enterprises which are engaged or desire to engage in selling window glass, and to injure dealers, distributors and others who do not desire to conform to the respondents' program but are compelled to do so by the concerted action of the respondents.

In answering the complaint, the respondents admitted all the material allegations contained therein, except that charging the manufacturers with fixing and maintaining uniform prices at which their products are sold, which charge the commission investigation failed to substantiate.

This 5-cu. yd. dump truck is being lowered by cables down the 115-ft. face of the quarry of the Manegold Stone Co., Milwaukee, Wis., where it will permanently remain, its operation confined to the quarry floor, about 6½ acres in area. Two other trucks of similar capacity were also lowered into the quarry by this method. All will be used to deliver broken stone from the power shovel to the crusher hoist, eliminating the relaying and replacement of tracks, rail transportation having formerly been employed. (Milwaukee Journal photo)

Quarry in the Annville limestone which supplies soft, friable stone to the Millard pulverizing plant.

H. E. MILLARD ENLARGES PULVERIZING PLANT

FOR many years one of the chief sources of supply for lime and crushed-stone plants in Pennsylvania has been the Annville ledge of limestone. Many cement plants in the Lehigh Valley obtain high-calcium limestone from this ledge, which also supplies the large and modern new H. E. Millard lime plant.

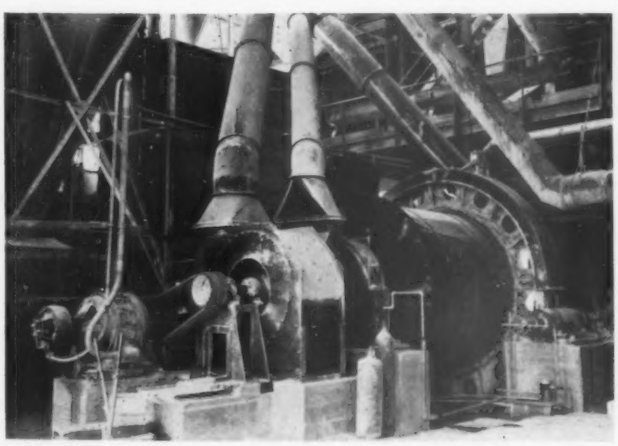
Not far from this plant near Annville, Pa., Mr. Millard has for many years been operating a limestone-pulverizing plant. This is supplied from a section of the Annville ledge in which the limestone is much softer and more friable than elsewhere. In spite of these characteristics, however, this stone is too tough to be dug with a shovel and must be drilled and blasted in the usual manner. It requires at least as much explosives as the harder stone in other parts of the ledge.

Analyses of this stone show over 99 per cent. CaO and an average of 15 per cent. moisture in the quarry. Its nature is such that passing it through the primary crusher and rotary drier reduce it to the following analysis:

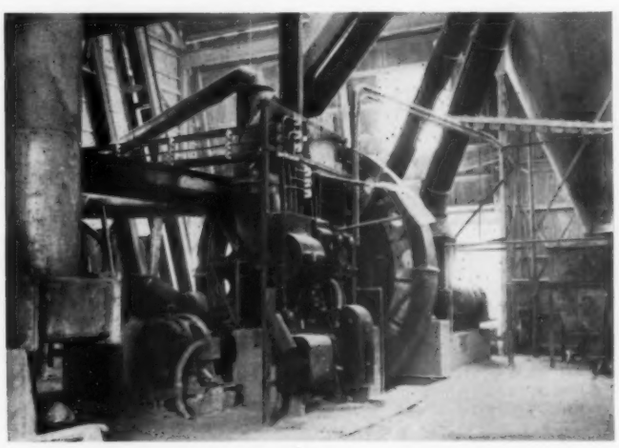
98.06 per cent. passing 20-mesh
93.10 per cent. passing 60-mesh
89.51 per cent. passing 100-mesh
76.76 per cent. passing 200-mesh

The demand for the plant's products has grown rapidly in recent years and it was decided to install equipment to increase its capacity. A new ball-mill and vertical drier were put into operation last summer to supplement the existing pulverizer and rotary drier. The screw-conveyors and elevators required to serve this equipment were supplied by the Link-Belt Co. Other improvements were also made to the existing equipment to enable it to handle the increased output.

In the quarry the stone is loaded by a ¾-cu. yd. Marion steam shovel into 2-ton mine cars. These cars are hauled by mule power to the foot of the incline and by cable and hoist to the plant. The stone is dumped from the cars into an Allis-Chalmers No. 6 gyra-



The 8-ft. by 8-ft. ball-mill and fan.

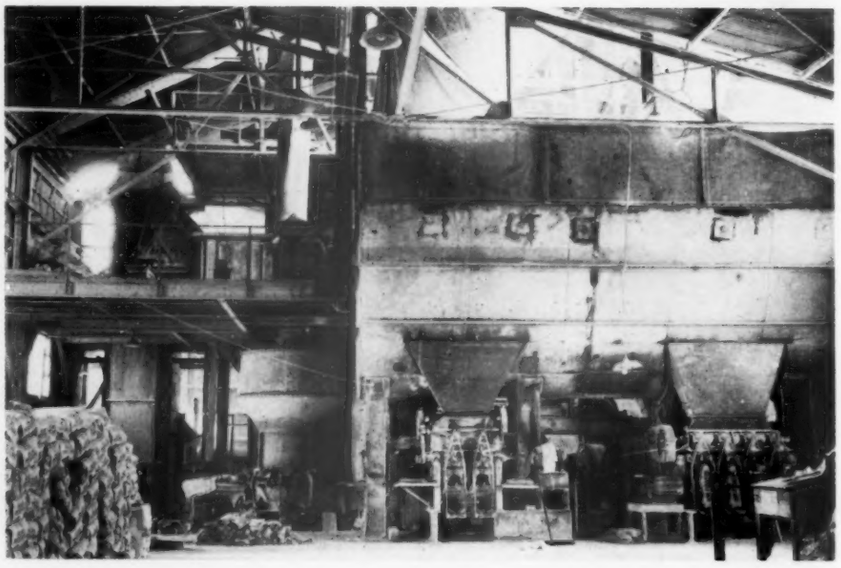


Another view of the mill showing drive and controls.

tory primary crusher which reduces it to 4-in. size and under. A belt-bucket elevator feeds the crushed rock on a short belt-conveyor, which has a Dings magnetic-separating head pulley to remove tramp iron.

The stone can be discharged either direct to the mill-feed bin or into the drier flow. In the latter case a revolving screen with 1-in. perforations is the first step. The oversize material drops into a Universal Crusher Co. hammer-mill with ¼-in. grate openings. The product of this crusher and the material passing through the screen are discharged into a 100-ton wooden drier-feed bin. A 16-in. screw-conveyor feeds the material from this bin into a 5-ft. by 30-ft. Ruggles-Coles direct-fired rotary drier. A mixture of coal and coke is used for fuel as coal alone discolors the product. The discharge from the drier can go into a screw-conveyor which feeds an elevator to the mill-feed bin previously mentioned.

Bucket-elevator which handles the stone.



Two packers under the packer-feed bin as enlarged. Old No. 2 pulverizer at left center.

The rotary-drier product can also be discharged into an elevator feeding the Kennedy-Van Saun tower drier, which is 6 ft. square and 55 ft. high and has 23 sets of baffles. It is fired direct from a 6-ft. by 10-ft. Kennedy-Van Saun furnace designed for stoker firing. An exhauster fan draws the hot air up the drier counterflow to the falling material, which is discharged through an air lock in the bottom of the drier into the elevator previously mentioned for transfer to the mill-feed bin.

This elevator can discharge either direct into the mill-feed bin or on a Sturtevant Moto-Vibro electric vibrating screen with 12-mesh cloth. The material pasing through this screen is sold for glass manufacture and is loaded from a screw-conveyor direct into cars.

The steel mill-feed bin has a capacity of 25 tons. The original Bethlehem No. 2 pulverizer is fed from it. A fan draws the finished product out of the mill into a cyclone, from which a screw-conveyor carries it to one of the two 50-ton packer-feed bins. This mill has a capacity of 3 tons per hr. when grinding to 90 per cent. through 200-mesh and all through 60-mesh.

The new 8-ft. by 8-ft. Kennedy-Van Saun ball-mill is fed by a Link-Belt screw-conveyor from the same 25-ton bin. The product of this mill goes to two 4-ft. cyclones and one 14-ft. cyclone. Only the excess air from these cyclones is vented, the remainder going back into the mill. The product of the two small cyclones is discharged into the packer-feed bin to which the Bethlehem mill product goes. The 14-ft. cyclone makes a super-fine product which is discharged into the second packer-feed bin. The ball-mill has a capacity of 25 tons per hr. when grinding 100 per cent. through 200-mesh. It is driven through a V-belt by a 200-hp. Westinghouse motor mounted on an American Pulley Co. rocker base. The fan is driven by a 100-hp. G.E. motor, and the feed screw by a 5-hp. Link-Belt P. I. V. variable-speed unit.

The original 50-ton packer-feed bin served the Bates 2-valve packer. This bin was enlarged to 100-ton capacity, and the second compartment now feeds the new 4-tube packer. For bulk loading the product of either mill can be discharged into another bin, from which cars are loaded by a Fuller-Kinyon pump. Most of the product is sold for mine dusting, fertilizer and asphalt filler and as agricultural lime.

A view in the warehouse showing filled bags ready for shipment.

Ways to Stimulate Residential Construction Sought at Meeting

A TWO-DAY conference on local residential construction was held in Washington, D. C. on November 17 and 18 under the auspices of the Chamber of Commerce of the United States and attracted a large attendance of construction leaders. The purpose of the gathering was to analyze the cause of the slowing down of home building and to stimulate activity in that field.

In his address opening the conference, John W. O'Leary, chairman of the executive committee, declared:

"Business, labor and the government are all eager for the building program to go forward vigorously. No one of these elements wants to obstruct recovery. Through misunderstanding or through possessing only a partial understanding of the factors which induce building and retard it, they may be doing so. To the extent that these restrictive factors lie within the power of management to correct, we are confident that business men will take the necessary remedial action. To the extent that these restrictive factors lie outside the control of business, and are the result of obsolete municipal codes, inequitable taxes, or other matters which lie within the realm of governmental action, we must then look to government for its coöperation in order to clear the tracks.

"The objective of this conference is a difficult one. If we can realize it only partially as a result of full discussion, we will have been justified, we believe, in asking you men to come here and sit down with us to go over this situation. The stimulation of healthy and continuing activity in residential building is of the utmost importance. Any clarification of our thinking about the causes which are interfering with this activity is bound to be helpful to all concerned."

Various other speakers stressed the necessity of stimulating privately-financed low and medium-priced residential building. It is intended to develop a constructive and positive program on the part of industry to overcome the slackening in the last few months of the rate of increase in residential building.

The estimated number of urban dwellings built each year since 1930 is:

1930	303,000
1931	219,000
1932	94,000
1933	64,000
1934	59,000
1935	138,000
1936	275,000

It was brought out at the conference that, for the years 1920-1929, the average number of family residential units built in urban and rural nonfarm areas was 677,000. In 1928 private residential building accounted for some 40 per cent. of a total eleven billion dollar volume of private and public construction. In 1936 it accounted for only 18 per cent. of a total six and three-quarters billion dollar volume.

At the beginning of 1937 it was the general opinion that there would be an increase this year over the 1936 volume of between 50 and 60 per cent. In the past few months, however, the rate of increase has materially slackened so that it now appears that the increase will scarcely be more than half of that predicted.

It is evident that the continued recovery of residential construction is important. The normal balance between private and public construction needs to be restored. An increase in private residential construction will help restore this balance and also will make a substantial contribution to general business recovery. This increase must depend upon private enterprise, the speakers emphasized.

The government's slum-clearance program at most can provide only a small fraction of the total dwellings required; namely, some 35,000 to 40,000 units annually for the next three years out of a total annual requirement of several hundred thousand. Past performance makes even this expectancy problematical. After five years of effort to date the government has built or has under construction only 27,161 units.

Quite a hue and cry has been raised during recent months as to the supposedly rapidly rising prices of building materials and the consequent depressive effect thereof upon the current volume of building construction. Much also has been said about so-called excessive labor costs and high union wage scales among the building trades. Statements to the effect that material prices and building costs are unwarrantably high have appeared widely through the press in the guise of news items and opinions of financial and economic writers. The result has been much loose thinking by the general public on a subject that is of paramount importance to the prosperity of the country during the next few years. It is pertinent for all concerned to know if a recent rise in material prices has occurred and if so, its extent and position in respect to previous price levels. Also of interest is the position of union wage scales among the building trades, for prices of materials and labor are commonly believed to exert considerable influence upon the rate of construction activity.

Data in regard to current wholesale prices of commodities and union scales of hourly wage rates are collected by the U. S. Department of Labor and form the basis for most items appearing in the press in regard to price and wage rises. Inspection of available statistics, it was pointed out, appear to warrant the following conclusions:

1. Building materials as a group are still lower in price than in 1926 and for September, 1937 were approximately at the 1929 level.

2. Building-material prices as a group have increased approximately 35 per cent. from the distress levels of 1932 to September, 1937. The present level is approximately the same as during the building boom prior to 1929, and while substantially above prewar levels, (in line with wage levels and all other commodities) is very substantially below the inflationary peak of 1920.

3. During 1934, 1935, and 1936 the composite building-material price index remained fairly constant at about 86 per cent. of the 1926 level. A pronounced rise occurred during the early months of 1937, reaching a peak in May of 97.2 which declined to 96.2 by September of this year. This rise was caused in part by a rise in lumber prices. The index for the lumber sub-group averaged 84.5 during 1936 but rose to 103 in May and subsequently declined to 99.0 for September, 1937. The price index of the lumber sub-group, however, is still below the 1926 level and is but a few points above the 1929 average. Struc-

tural steel, plumbing and heating, and brick and tile price indexes have also shared in the rise as have a number of other building materials.

4. Hourly wage rates in the building trades as of May 15, 1936 were but slightly higher than for 1932 through 1935 and were substantially lower than in 1926 and the period from 1929 through 1931.

One of the most interesting talks of the conference and one that contained some whole truths and basically-sound ideas was that delivered by W. D. M. Allan, director of promotion of the Portland Cement Assn. Mr. Allan's subject was *Stimulating and Widening the Market for Small House Construction.* What he said is worth repeating in its entirety:

"Our presence here implies that there isn't enough house building activity to suit us; or, in other words, not enough folks are willing to exchange their money for houses the construction of which would result in a profit to the house building industry. Briefly, houses are not a good buy so far as the public is concerned at present.

"We might ask ourselves why it is that in 1925 and 1926 there were built and sold 700,000 to 800,000 housing units and in 1937 a scant 200,000. Better and more livable homes are now available. Financing has been greatly improved. Cost of construction is lower. Population is larger. Builders and materials are readily available, and there is a much talked of shortage of housing. But the fact remains that several hundred thousand families prefer not to build houses. In 1927 houses were a good buy for large numbers of people; in 1937 they are not a good buy.

"While under present conditions there is no such visible potential market for individually-owned houses as is frequently stated by those who look at the census reports and assume that every family should or could own a house, it is a fact that several hundred thousand families which had the money and income and could have built in 1937 decided that building a house was not a good investment. It is easy to understand why folks without money do not build. But why do folks with money refuse? If we can find the answer to this problem, possibly enough building can be started to give employment to those who do not have sufficient funds so that they, too, in increasing numbers can build houses.

"The following are, in my opinion, some of the less commonly mentioned but, nevertheless, important reasons why folks who could afford it do not build. These reasons are in addition to high real-estate taxes, general business uncertainty, large unemployment and depletion of family reserves.

"(1) Prospective buyers have been told repeatedly by the building industry that just around the corner they can get a factory-made house with all the modern conveniences at about one-half the price they would pay for a house constructed by ordinary methods. Suppose that a leading automobile maker would announce several times during the year that in a short time a new model would be available that was far superior to the present model and at half the price. How many of his present cars do you suppose would be sold? Not many, I am sure. Is it any wonder that a great many potential house buyers are still waiting for their $6,000 house for $3,000?

"Our laboratory and field research will be driven at full speed to cut costs and improve products, but our press agents will be kept out of the laboratory until its findings have been proved. Publicity which jumps the gun by five to ten years does no end of harm.

"(2) A second important reason why folks aren't buying houses is that too many of their friends who did buy during the previous building boom are thoroughly soured on what they got. A house which in three or four years begins to say and crack, requires high maintenance expense and has low or no resale value is a poor investment. House buyers are being educated to know the requirements of good construction. When they see the same 'jerry-building' going on to-day that was common in the last boom, most of them go back to their apartments and spend their down payments on something in which they have confidence—but not a house. We have made our bed, and here we lie. Until it is corrected, house building will suffer—unless a powerful speculative market develops in which quality construction will mean nothing.

"Somewhere along the line in the designing, building or financing of a house, there must be some agency with a sufficiently strong selfish interest in sound construction to prevent the continuation of 'jerry-building' and to restore the public confidence in home ownership.

"The building-material producer can coöperate, but he can not stop misuse of his materials. He has little or no supervision over them after they leave his plant.

"City building departments can not do it, because they are too grossly under-staffed.

"The contractor can not do it, because he is forced to bid down to a price which too often precludes sound construction and materials. He gives as much as he can for the price he can get. But he cannot give a two-dollar value for a one-dollar price.

"The better grade of realtor can be a factor, because he frequently deals with intelligent people who can be sold on good construction. There is in nearly every community one or more realtors who specialize in good construction even in the less expensive houses. But, by and large, the realtor can not be expected to take on any additional sales cost. Since so many of his prospects are ignorant of construction requirements, a few gadgets and bright colors generally turn the sale.

"In the majority of cases, somewhere along the line the prospective house builder must make arrangements for financing. He must sit across the desk from a responsible official of his local bank, building-and-loan association or some other financing agency. The banker has two selfish interests which should prompt him to have a keen interest in good construction:

"(1) He will probably sell the mortgage to some customer of the bank. The mortgage is no better than the quality of the construction on which it is drawn. If it is a jerry-built house, it's a jerry-built mortgage.

"(2) The citizen requesting the loan is a client or prospective client and relies on the banker's judgment. If the banker approves the loan, the borrower assumes that the construction is satisfactory.

"Of course, it is always easy to tell the other fellow how to run his business, but isn't the banker in a key position to stop 'jerry-building?' While he is negotiating with his client, couldn't he insist on the necessity of good construction? Couldn't he emphasize the need for supervision by some competent inspector, if no architect is to be employed? Couldn't he point out that the supervision would cost only $40 to $50 and that he would make the loan contingent on this supervision, paid for by the borrower?

"If several lending agencies in a given market adopted some such plan, the fees collected would allow the employment of an inspection agency comparable in function to the inspection service of the Underwriters' Laboratories. Such inspection would kill 'jerry-building' forthwith. It would cost the bankers nothing. The borrower would save more the first year than the cost of inspection. The community would benefit richly because there would be fewer run-down, dilapidated houses to pull down property values.

"We are convinced that among the many changes that must take place in order to put house building on a sound basis, the following three things are very important:

"(1) Public confidence in home ownership must be restored.

"(2) There must be developed in each community house-building organizations which will combine as many as possible of the various transactions necessary to provide houses, including the acquisition and improvement of the real estate, construction, financing, insuring and selling of houses. Such organizations can handle a sufficient volume of business to take advantage of the economies made possible through volume production.

"(3) Manufacturers of building materials and equipment must devise the most efficient and lowest-cost methods of using their products and assist in training the various craft in their proper use, so that unnecessarily high prices are not quoted due to ignorance.

"In the Portland Cement Assn. program for 1938, we shall endeavor to build public confidence in home ownership through national advertising, literature distribution and personal contact with key buyers to show them that houses properly designed and built are a wise investment.

"We shall try to encourage financing agencies to insist on rigid inspection of houses which they finance.

"Working with one or more realtors in various communities, we will help them to use concrete for various parts of home construction with maximum economy.

"Throughout the depression, the Portland Cement Assn. has been carrying on research studies to develop the more economical ways for using concrete. The best type of proved construction which is now available is concrete masonry for walls, precast joists for floors and roofs.

"The development of precast concrete joists cut the cost of concrete-floor construction in residences by about 30 per cent. The reduced cost is due to the elimination of a large part of the form work. Concrete residence floors are now on a competitive basis with ordinary construction. Firesafe floors of this type have been extensively used on low-cost houses in several Federal housing projects. In St. Louis, more than 200 frame residences have been built in the last two years with concrete first floors. This type of floor construction gives the same rigid foundation for the interior part of the house as the foundation walls give to the exterior and, in addition, they are firesafe.

"In order to be sure that masonry walls would be water-tight, an investigation has been conducted for two years in which sample of various kinds of walls have been placed in a tunnel in which is developed a wind velocity of as much as 60 miles per hour. Water jetted across the tunnel is driven against the walls at high speed. It has been found that two coats of Portland-cement paint properly applied to such walls, covering the mortar joints as well as the units, renders them water-tight even with rains of cloud-burst intensity and hurricane velocity. The use of Portland-cement paint for making walls water-tight reduced the cost of concrete wall construction at least six cents per square foot over previously used methods of weather-proofing.

"Concrete builders in the majority of markets are now able to offer for sale a house that has a high degree of fire resistance, all structural metal fire-proofed by at least three-fourths inch of concrete, protected against termites; houses which reduce plaster cracking and interior and exterior maintenance —at a price competitive with ordinary construction.

"One problem we have had to contend with is the tendency of owners to use more and higher-priced plumbing, heating and lighting equipment when they build concrete homes. This is a point that all of us should keep in mind in discussing the cost of building. The structural part of a home, including foundation, walls, floors and roof, rarely represents more than 50 per cent. of the total cost, usually less. While substantial savings have been and are being made in the cost of the structural part, the tendency has been to install more and more equipment as the cost of the structural part was reduced. In many cases, if the walls, floors and roof of the house were furnished free, the house would still be in the high-priced bracket.

"We were very seriously challenged some time ago in stating that a certain house had been built for $5,800. A prospective owner had taken bids on the house and the price he got was $7,500 in the same market. In checking the plans we found that among the high-priced equipment included was a $1,500 heating and ventilating plant.

"The thing that builders have learned but a great many writers on housing subjects apparently have not is that you can't put $4,000 worth of equipment into a $5,000 house. The wise home owner will not attempt it. He knows that if he skimps on the floors, walls and roof of his house he is in for a high maintenance bill and rapid depreciation. It is far better for the prospect of limited means to be sure that he has a home which is structurally sound and one into which he can place, as his financial conditions improve, the latest styles of equipment without any loss. He also knows that if he sacrifices on his structure, the place will depreciate very rapidly and his fine interior equipment will depreciate along with it. Equipment styles change from year to year, as do automobiles, and new models can be purchased at will; but the structural part is either sound at the start or it is never any good.

"Much publicity has been given to the factory-fabricated house. There are at least 25 inventors working on concrete houses of this style. Our minds are open and we are encouraging developers of this construction. There seems to be no question but what such houses can be built. The big questions are whether the public wants such standardized construction and whether the costs are really lower when all factors are considered.

"During our work on factory-made houses, the various design, manufacturing and sales obstacles were tabulated and studied. They made quite a formidable problem. One of our men suggested that while part of the time was put on making houses in a factory and moving them to the site, why not try moving the factory to the site. It was a crazy idea at first. "Who has ever heard of moving an automobile factory around to the home of each buyer?" Building houses and building automobiles have little in common, so the "crazy idea" was tried. To-day it looks like the best thing that we have hit on yet. We're going to move the house factory to the site.

"Roughly, this method of construction involves the building of adequate foundation and first floor. The walls for the house are cast in a horizontal position on the floor, one at a time. Four- or six-inch form boards are laid on edge as the outside form for the wall; insulation is then placed on the floor, conduits, window and door frames then tacked to the insulation. Insulating reinforced concrete is then put in place. The walls are finished with large floats similar to those used for sidewalks and paving—large production tools. Any kind of color or texture can be obtained with the minimum amount of time. When the wall is 24 hours old, through the use of a specially designed hoist, it is raised to a vertical position, full-story height and wall length in one piece, in 30 to 40 minutes. This method of construction eliminates practically all form work, greatly reducing cost.

(Continued on page 52)

The new soda-spar works of the Western Feldspar Milling Co. at Denver, Colo. The loading tanks are at the right.

By W. E. TRAUFFER

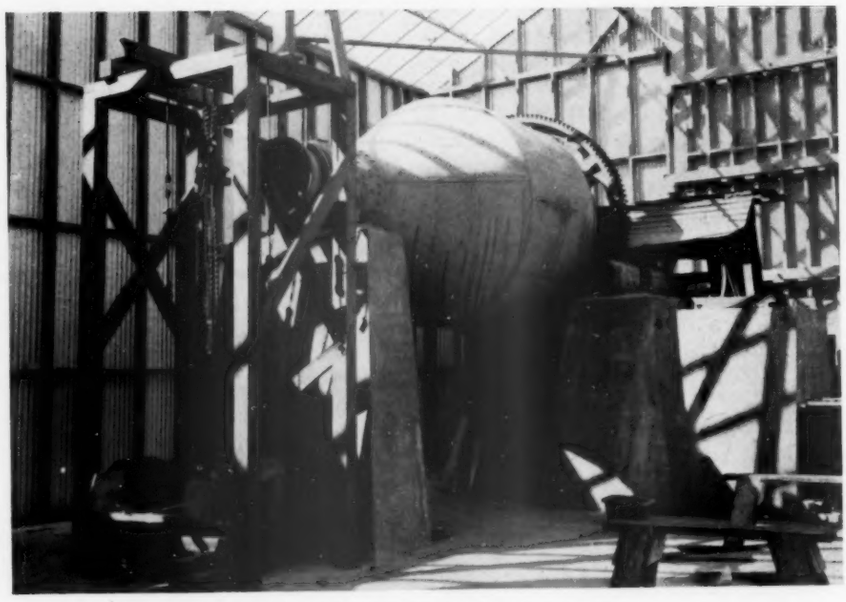
DENVER FELDSPAR FIRM EXPANDS PLANT

THE Western Feldspar Milling Co. of Denver, Colo., has under way in that city one of the most important nonmetallic-mineral plant developments in the Rocky Mountain states in recent years. This company operates a feldspar-grinding plant which has been tripled in capacity in recent years until it now has a capacity of 45,000 tons annually. A plant which is now near completion for grinding soda spar and lepidolite will have a capacity of 15,000 tons annually. Following completion of this plant a fluospar-grinding and flotation plant will be built and later a mica-grinding plant. It is planned to have all these plants in operation by the autumn of 1938. The grading and loading tracks for the two last-mentioned plants have been completed and much of the equipment is already on hand.

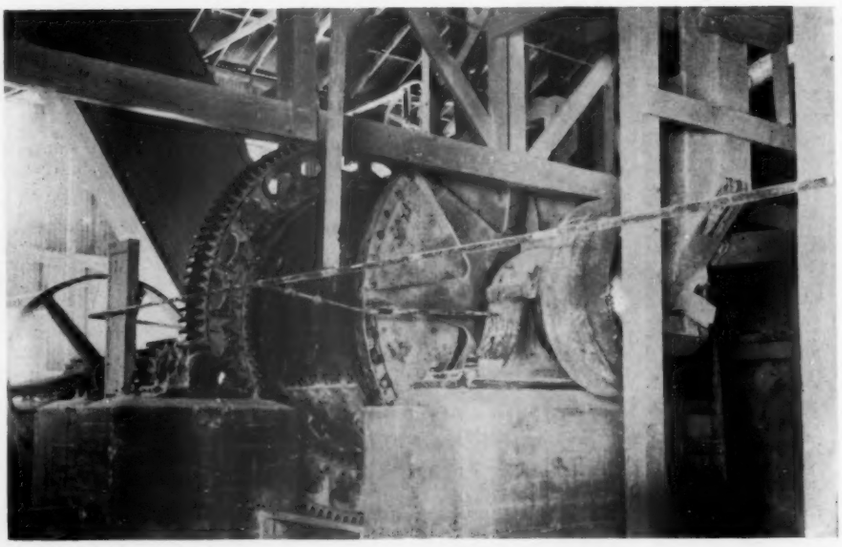
J. W. Magnuson, president of the Western Feldspar Milling Co., pioneered in the development of nonmetallic-mineral production in Colorado. Mr. Magnuson has been connected with various mining operations in the state for the past 43 years. In 1925 he built an experimental grinding plant in Denver and in 1926 incorporated his present company. A commercial feldspar-grinding plant which forms the nucleus for the present expansion program was built in 1928.

The original plant equipment consisted of a crusher, a conical mill, belt-conveyors, elevators, etc. Later a second complete set of equipment was installed and in 1936 a third set was added. In 1937 a dust-collector was installed and other improvements made.

The company's output of ground feldspar has increased steadily and for 1937 is expected to total about 40,000

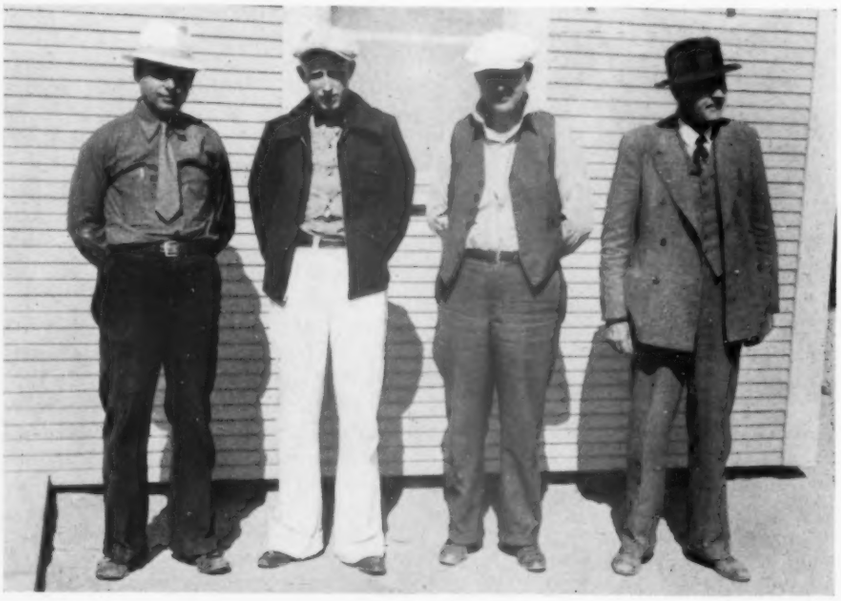


Conical mill being installed in the new plant.



Another type of mill in service at the feldspar plant.

Feldspar plant and office with new soda-spar plant at the right.



The four Magnusons—Arnold, the superintendent; Carl, traffic manager; Vernon, secretary-treasurer; and the father, J. W. Magnuson, president and general manager.

tons. This does not include a large amount of other crude nonmetallic minerals sold by the company, including mica, lepidolite, etc. This plant has been operated 24 hr. a day, 7 days a week, the year around to meet the demand.

The company has control of 56 properties in different states and these contain unlimited quantities of various nonmetallic minerals. Some of the properties are owned outright and on others the company has long-term leases. Eight of these properties are being worked at present and some crude material is also being purchased. Feldspar is at present being obtained from deposits in South Dakota, Colorado and Wyoming.

Crude feldspar is unloaded from cars at three different points to the three different grinding circuits in the feldspar-grinding plant. At two of these unloading points crude feldspar is unloaded from the cars into two 9-in. by 16-in. Universal Crusher Co. jaw crushers, which feed one 5-in. Allis-Chalmers Newhouse secondary crusher whose product is stored in a 425-ton bin. Either of the two Hardinge 8-ft. by 60-in. conical mills or the Allis-Chalmers 8-ft. by 60-in. mill can be fed from this bin. The products of the original Hardinge mill and the Allis-Chalmers mill go to a Simplicity vibrating screen. The fine material passing through this screen goes to a 14-ft. Gayco separator from which the fines go to loading bins.

Magnetic-separator pulley on conveyor to bucket-elevator.

A third circuit ordinarily used for grinding special spars consists of another 9-in. by 16-in. Universal jaw crusher, which discharges its product into a bin feeding the new 8-ft. by 60-in. Hardinge mill. A Simplicity screen scalps the mill product and the fines go to the separator already mentioned. In either of these flows the product of the screen or of the separator can be marketed. These products can be loaded into cars either direct or from the bins. What little sacking is done is accomplished through spouts. With this arrangement two or three sizes of feldspar can be produced simultaneously or the entire plant capacity can be concentrated on one size.

The 5-in. Newhouse crusher used for secondary reduction of feldspar.

The belt-conveyors feeding each of the mills are equipped with Dings magnetic head pulleys. Other provisions of the original design utilize further magnetic and air-separation methods to insure the removal of all iron, mica and other impurities from the finished product. A Norblo dust-collector is connected to all the equipment, and pipes with flexible connections extend into the cars being loaded.

The soda-spar plant, which is now under construction, has a flow-sheet similar to that of the feldspar plant. A Universal Crusher Co. jaw crusher, an 8-ft. by 60-in. Hardinge mill, Dings separators, a vibrating screen and an air-separator are the major equipment units. Three 216-ton conical-bottom steel tanks will be used to store the finished product.

The fluorspar plant will use the flotation process and will have a capacity

The 14-ft. separator which serves the three mills in the feldspar plant.

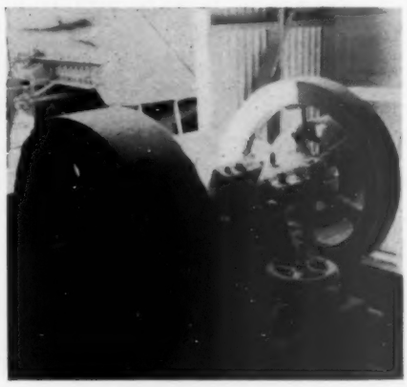
of about 60 tons daily. The equipment will include a Hardinge mill, a rotary drier, a screw classifier, a filter, etc.

Not all the equipment for the mica plant has been selected. A Morse Bros. tube-mill will be used and some of the other equipment will be built specially.

In this program will be included the construction of a modern new office building on the property, which is located at 1333 W. Maple St., in the Valverde section southwest of downtown Denver. This property is within the switching limits with connections to all railroads. In addition to the usual standard-gage tracks the plant truckage includes narrow-gage tracks for the mountain railroads common to this territory.

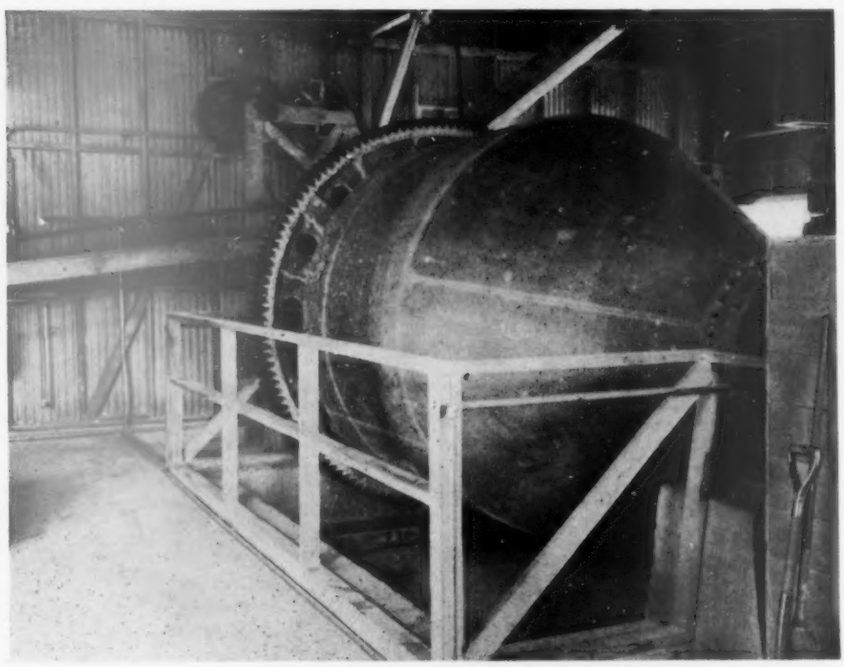
The present feldspar plant produces material ground as fine as 99.5 per cent. through 200-mesh. The soda spar plant will grind soda spar and lepidolite to the same fineness for the glass and pottery trade. The later plants will grind mica for use in paints, greases, etc. and fluospar for the glass trade. Eventually many other pottery, ceramic, glass and paint materials will be ground.

In these plants all the large motors are Allis-Chalmers and the others are



The new 9-in. by 16-in. jaw crusher in the soda-spar plant.

divided between General Electric and Westinghouse. V-belts, most of them supplied by the Gates Rubber Co., are used wherever possible. Pioneer conveyor belting and a few flat drive belts are used. Jasperite lining and pebbles made by the Jasper Stone Co., Jasper, Minn., are used in the grinding mills. Acording to Mr. Magnuson, this material wears much better than imported lining and pebbles. Worn crusher jaws, etc., are built up with Esco manganese.



The new 8-ft. by 60-in. feldspar mill with feed conveyor in background.

Housing

(from page 49)

It allows the placing of any size doors, windows or other openings in the walls, without cutting or fitting. When all four walls are erected, they are fastened with a reinforced-concrete tie at the corners, making a stantial home-building market can be completely-reinforced concrete wall.

"The advantages of moving the factory to the site are:

"(1) The elimination of large factory overhead and the reduction of cost on the job to a minimum.

"(2) Almost unlimited architectural flexibility. Doors or windows do not have to be of standard size or shape. Openings can be placed anywhere desired. The house can have any width or length desired. No set modules are necessary. Every one of 100 houses in the same sub-division can be different from all the others with regard to size, height, color, texture and still make use of the advantages of many factory-production methods.

"The method of construction, we believe, reduces the structural cost of a durable, firesafe, low-maintenance-cost house to a minimum. What the ultimate cost of the house will be depends on the cost of the heating, lighting, plumbing and ventilating equipment. It may be a $4,000 house, if placed on a $500 lot and simple equipment is employed; or, it may be a $6,000 house, if placed on a $1,000 lot and expensive equipment is used.

"In conclusion, I would like to leave just this one thought: Before any substantial home-building market can be created, public confidence in home ownership must be restored and the first step toward this is to demonstrate to the buyer a house within his means which he is happy to own. Our program for stimulating house building has this as its central theme."

Surveys Mineral-Wool Resources of Michigan

That Michigan contains large deposits of limestone suitable for the manufacture of rock wool is indicated by a preliminary survey made by the Michigan state geological survey during the past summer.

In a reconnaissance survey over the state, samples were taken from outcrops and quarries in various limestone and other formations which appeared to have potential value for rock-wool manufacture. Dr. R. A. Smith, state geologist, planned the investigation.

By LEO T. PARKER

The Liability of the Purchaser Who Rescinds Contract of Sale

THERE are many reasons why a purchaser of nonmetallic products, as crushed stone, granite, cement, sand, gravel, and the like, may refuse to accept delivery. Also, after delivery is accepted the purchaser may, for numerous well-defined reasons, rescind the contract and demand the seller to take back the materials.

For illustration, a rejection of delivery or rescission of a contract may be based upon fraud on the part of the seller or his agent. However, contrary to the opinion of the majority of sellers, the legal meaning of "fraud" or "deceit" is widely different from its ordinary dictionary definition. Legally, actionable fraud on the part of a seller means that all the following facts can be proved by the purchaser:

(1) There must have been conduct, acts, language, or silence on the part of the seller amounting to a misrepresentation or a concealment of material facts from the buyer.

(2) These facts must have been known to the seller *at the time and before* the sale contract was completed.

(3) That these acts, statements were fraudulent must have been *unknown to the purchaser* at the time he made the contract.

(4) The defrauding acts of the seller must have been done *with the intention, or at least with the expectation,* that the purchaser would be influenced.

(5) The conduct or promises of the seller must have been relied upon by the purchaser.

Therefore, it is well established that although a seller practices deceit upon the purchaser the latter has no legal recourse if, before the sale was made, he did not *believe* that the deceitful actions or fraudulent statements were true.

Under all circumstances a purchaser may without liability refuse to accept nonmetallic products, or he may rescind a contract for materials in his possession, when either (1) the material does not comply with the terms of the contract of sale; or (2) if the seller has failed to ship by the carrier specified in the contract; or (3) if the seller ships c. o. d. instead of on open account stipulated in the contract; or (4) if the object of the contract is illegal; or (5) if the seller rescinds or changes the contract; or (6) if the seller performs any other breach of the contract; or (7) if the seller fails to make delivery at the promised time.

It is well established that a seller who breaches a contract of sale is liable in damages to the purchaser. Moreover, various courts have held that, if a seller breaches a sale contract, the purchaser may: (1) upon discovery of the breach rescind the contract and sue and recover from the seller the money paid, in which case he must restore the materials he has received by virtue of the contract; or (2) sue to cancel the contract, and in such case it is sufficient for him to offer to restore everything of value which he has received under the contract; or (3) affirm the contract, retain the materials and sue to recover the damages sustained by reason of the seller's breach.

Rights of Seller.—On the other hand, it is important to know that a purchaser of nonmetallic materials can not, without valid reasons, breach a contract of sale and refuse to accept delivery of materials. Where the contract of sale does not clearly specify the seller's remedy, if the purchaser refuses to take the materials and pay the agreed price therefor, the seller may resort to either one of three remedies, *viz.*: (1) Standing on the sale, he may retain the materials for the purchaser and sue for the full purchase price; (2) acting as the agent of the purchaser, he may resell the materials, and then sue the purchaser to recover the difference between the contract price and the price obtained on the resale; or (3) he may treat and keep the materials as his own and recover from the purchaser the difference between the contract price and the auction sale price or highest price obtainable at the time and place of delivery.

Obligations Not Varied.—Generally speaking, the obligations assumed by both buyer and seller are not varied, although something happens that makes it impossible for one to fulfill the terms of the contract. In other words, unless the contract contains a stipulation that entitles either the buyer or the seller to rescind, change or vary the contract, he is obligated to fulfill its terms or pay the other damages, notwithstanding unforeseen circumstances.

For instance, in Myers Brothers *v.* Hager, 98 S. W. (2d) 36, it was disclosed that Myers Brothers and Arch Hager entered into a written contract by the terms of which Hager agreed to crush and deliver into a bin approximately 2,700 cu. yd. of crushed limestone, meeting the state highway specifications for coarse aggregate, for which Myers Brothers agreed to pay him $1.50 per cu. yd. Myers Brothers further agreed to pay him $1.75 per cu. yd. for any fine aggregate in the bin, meeting the specifications for Class A concrete, "the fine aggregate to be approximately 700 yd." After Hager's machinery had been operated a few days the engineer of the State Highway Dept. made a field test of the fine aggregate. Soon afterward the Federal engineer informed the parties that "the Federal requirements that had just been passed out to them would prohibit the use of limestone screenings on a Federal job, and for that reason, could not use any more" limestone screenings. Thereafter the use of limestone screenings, or the fine aggregate mentioned in Myers Brothers and Hager's contract, was discontinued.

The legal question presented to the court was: Did the new Federal ruling relieve Myers Brothers from the obligation to pay Hager for the fine aggregate, mentioned in the contract, which was a by-product of the production of the coarse aggregate? In holding that Myers Brothers were bound to accept and pay for all the fine aggregate produced while Hager crushed the coarse limestone, this court said:

"It is adequately established that Hager had no contractual or other relation with the highway department . . . . In construing their contract we must look to and consider all its language, as well as the subject-matter with which it deals in the light of the circumstances accompanying the parties at its execution. It is our duty so to construe it as to give it such effect, and none other, as the parties to it intended at the time it was made."

Purchaser Legally Accepts Shipment.—If the purchaser accepts delivery of nonmetallic materials he is a debtor of the seller. In other words, until the acceptance is made the purchaser is not a debtor of the purchaser, and the seller can not sue the purchaser for the contract price. Therefore, it is important to know what is legal acceptance by a purchaser?

The higher courts have held that the following cases constitute legal acceptance of nonmetallic materials: (1) acceptance of a shipment without the purchaser making a complaint of the price, quality or quantity *within a reasonable time* after the shipment arrives; (2) acceptance of a shipment by a purchaser who makes prompt and justifiable complaint, but afterward is negligent in safeguarding the shipment, whereby it is lost, or damaged; (3) acceptance of a shipment by a purchaser who makes a prompt and justifiable complaint, but subsequently uses or sells the materials; (4) acceptance of any portion of a shipment of unsatisfactory merchandise is legal acceptance of the complete shipment; (5) if the purchaser practices fraud which affects the legal rights of the seller, it is considered an act of acceptance.

Quality Varied.—Various courts have held that a seller can not escape liability for the full damage suffered by a purchaser where the former fails to furnish the quality of nonmetallic material specified in a contract. This is true although the quality supplied is the kind generally used for the particular kind of work.

For illustration, in Biedenharn *v.* Waters, 126 So. 508, a buyer and a seller made a contract, by the terms of which the seller agreed to furnish stone in accordance with specifications. The seller failed to furnish the exact quality of stone described in the specifications; also, some of the stone had broken corners. The seller attempted to avoid liability for this breach of the contract by proving that he supplied the quality of stone generally utilized in this kind of construction work. However, the court held the seller liable in damages, and said:

"It is indisputably shown that some of the stone was not of uniform size, and that some of it had broken corners . . . . The stone was not of the quality called for by the specifications."

Contract Not Varied.—Another important point of the law is that under no circumstances are the agreements, relations or obligations between a buyer and a seller varied by other contracts between third parties and the purchaser, unless the seller approves such other contracts or agrees to comply with their terms.

For illustration, in Koch Sand & Gravel Co. *v.* Koss Construction Co., 260 N. W. 54, it was shown that a gravel company contracted to sell gravel to a contractor, who entered into another contract with the state to perform certain construction work and use the same gravel. This contract between the contractor and the state contained a specification of the quality of the gravel. In other words, the contractor had a contract with the state in which there were certain provisions and specifications as to the tests which were to be made of the sand and gravel that were to be used in the construction work. The material was inspected by a representative of the state. This inspector held that certain portions of the gravel did not comply with the specifications in the contract between the contractor and the state and rejected them. The contractor contended that he was not obligated to pay for the rejected gravel: (1) because it did not equal the quality in the specifications; (2) and because the seller had impliedly agreed to deliver gravel that would comply with the specifications.

However, since the contractor did not prove that the gravel company had agreed to supply gravel equal to the quality specified in the specifications, the higher court held the gravel company entitled to recover full payment from the contractor, saying:

"The contract between the plaintiff [gravel company] and the defendant [contractor] was wholly independent . . . . It is our conclusion, therefore, that the contract between the state highway commission and the defendant [contractor] was wholly immaterial to the question under consideration herein."

Hauling Contract Breached.—In many instances parties to contracts, when interpreting their obligations, forget that the courts always endeavor to construe the intended meaning of the contracting parties at the time the contract was made, irrespective of the clauses contained in the contract.

For example, in Morrison *v.* Canyon Gravel Co., 283 Pac. 84, it was disclosed that a gravel company entered into a contract in which it agreed to pay a stipulated rate over a named period for having gravel hauled in motor trucks.

Pursuant to this contract the owner purchased new trucks and prepared to do the hauling. Before he began to haul the gravel company sent him a notice saying that the party to whom it had intended to sell large quantities of gravel had canceled the contract, and, therefore, no gravel would be hauled. The truck owner demanded that the gravel company pay for the trouble and expense of purchasing motor trucks to carry out the terms of the contract. The gravel company refused to make payment, and the truck owner filed suit.

In holding the gravel company liable, the court said:

"The contract is definite and certain regarding the employment, the material to be hauled, and the amount of compensation for service . . . . In construing a contract, the intent of the parties must be determined from the terms of the agreement."

Definite Proof Necessary.—Under all circumstances a buyer or seller who fails to introduce either a written contract, or witnesses to a verbal agreement, can not expect to receive a favorable verdict. Moreover, the fact that by mistake a purchaser pays more than the contract price in many past instances does not entitle the seller to collect in the future more than the contract price. This same rule is applicable in all classes of litigations.

For example, in Crow Creek Gravel & Sand Co. *v.* Hays Construction Co., 81 S. W. (2d) 416, it was disclosed that a highway contractor was required to use upon highway construction sand and gravel which was purchased by the state highway commission from a gravel company. A contract was made between the gravel company and the contractor, whereby the contractor was employed by the gravel company to unload the sand and gravel shipped for use in construction projects. In subsequent litigation the contractor contended that he was to be paid 20c. per ton for unloading the sand and gravel at the shipping destination. The only material or competent circumstances which tended to support the contention was that a credit memorandum was issued by the gravel company's bookkeeper to the contractor showing a credit on account for unloading sand and gravel at 20c. per ton. The bookkeeper of the gravel company who made up and issued this

(Continued on page 70)

By L. A. WAGNER
Research Chemist, Missouri Portland Cement Co.

NEW LABORATORY ENABLES THIS CEMENT FIRM TO FOLLOW TECHNOLOGICAL TREND

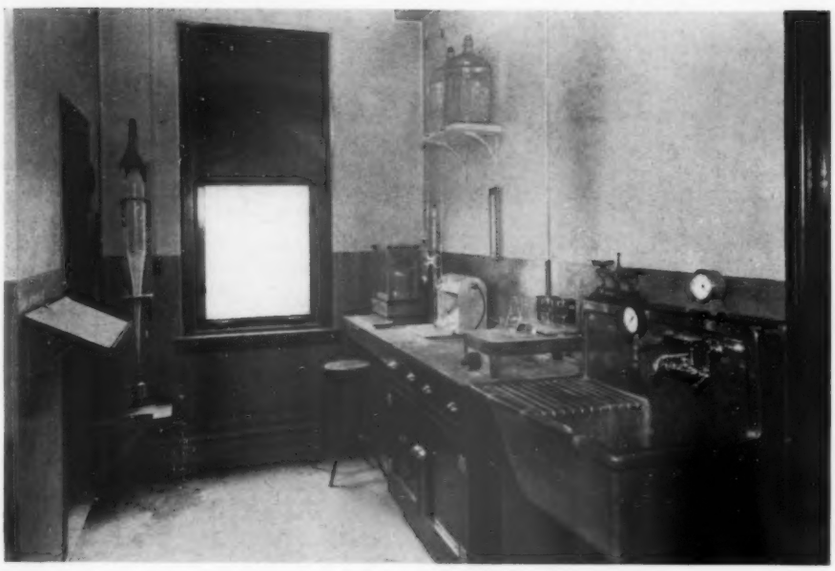


Fig. 1. Plant-control laboratory.

IN recent years there has been an increasing realization on the part of the cement industry that the manufacture of Portland cement and related products is no longer a simple procedure which may be controlled with a few "cook-book" tests, but is in reality one of the most complex of modern manufacturing processes. Undoubtedly the chief element which has forced this realization on the cement industry has been the demands of the state and Federal governments in procuring cements for the vast public works of recent construction.

When the cement specifications for Boulder Dam were being written a member of the Advisory Committee which assisted in that service told the writer that projects of such magnitude provided almost the only opportunities for real advancement in cement technology. In other words, engineers and architects in charge of ordinary construction projects were satisfied to accept usual materials and usual test methods without making inquiry as to whether or not changes might be advantageous. However, a project of the magnitude of Boulder Dam justifies full inquiry into every detail of construction materials. Such an inquiry gives cement technologists an opportunity to ignore standard practice and to develop new cements and new test procedures. For example, the present familiar use of surface area as a measure of the fineness of cements was brought about almost entirely by the Federal specifications for cement for Boulder Dam, which included for the first time surface-area requirements. Likewise our familiarity with the heat of hydration of Portland cement comes from that same specification.

In order to be abreast of new developments in cement technology, the management of the Missouri Portland Cement Co. early in 1936 decided upon an extensive modernization and enlargement of its operating and research laboratories. This program is now largely completed and in the fol-

Fig. 2. Constant-temperature room for physical tests.

Fig. 3. Moist-storage room.

Fig. 4. The chemical laboratory.

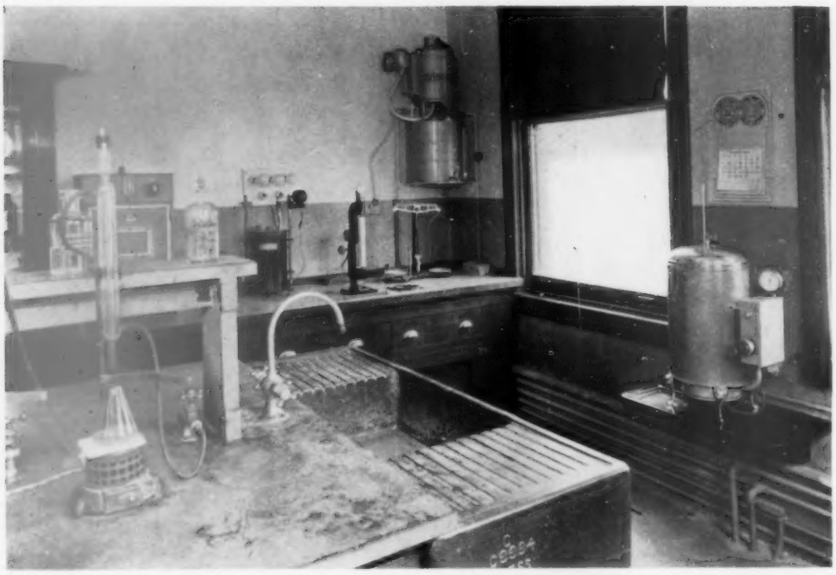


Fig. 5. Another view of the chemical laboratory.

Fig. 6. Room for miscellaneous physical tests.

lowing paragraphs the facilities of the new laboratory at the St. Louis plant are described.

The services performed by this laboratory bring about a natural division of work into rooms or laboratories, which may be enumerated as follows: (1) Plant-control laboratory; (2) Physical testing room (air conditioned); (3) Moist storage room (air conditioned); (4) Chemical-analysis room; (5) Miscellaneous testing room; (6) Concrete laboratory; (7) Cement-storage room; (8) Experimental grinding and burning laboratory; (9) Research laboratory; (10) Dark room; (11) Physical laboratory for resident inspectors; and (12) Office.

No attempt will be made to present a detailed description of every part of the laboratory, but rather an attempt will be made to describe those parts which are believed to be new or most modern and which may be of interest to others who are planning similar laboratory improvements.

The plant-control laboratory (Fig. 1) is characterized by a close proximity of the usual apparatus required for this work, namely, sink, wet-sieving apparatus, hot plate, titration stand, balance, and laboratory record sheets. As may be seen in the picture, these units are all on the same bench. A single hot plate is used for drying the slurry samples and the small wet sieves. The rear half of the hot plate is covered with a heavy piece of asbestos which maintains a temperature low enough for proper drying of the sieves while the front half of the hot plate is left uncovered for rapid drying of the slurry samples.

The physical testing room (Fig. 2) is constructed with heat-insulated walls and the temperature of the room is maintained at 70 deg. F. plus and minus 1 deg. by means of a Frigidaire unit controlled by two Minneapolis-Honeywell mercury regulators which cut in either refrigeration or electric heaters as required. The humidity of the physical testing room is maintained at 55 per cent. plus and minus 5 per cent. by means of a Walton humidifier controlled by a Minneapolis-Honeywell humidity regulator. The main work bench in the physical testing room is an especially-built all-steel unit. The top of the bench is fitted with refuse slots which open into steel waste bins underneath the bench. A steel sand bin, with compartments for standard and fine testing sands, is located in the center of the work bench. Space for two operators is provided at the bench, one on either side of the sand bins. Special equipment which should be operated at constant temperature is

located in this room. This special equipment includes the 10-in. flow table, the Rogers porous-plate suction apparatus, and a special stirring resistance plasticimeter designed by the writer.

The moist-storage room (Fig. 3), which is adjacent to the physical-testing room is also temperature- and humidity-controlled. The temperature-controlling equipment is identical to that described for the physical-testing room, and humidity is maintained at very nearly 100 per cent. by means of compressed-air fog producers. In the end of the moist-storage room adjacent to the physical-testing laboratory, and opening into this laboratory, is located a small cupboard for receiving briquettes, pats, cubes, bars, and other small specimens. A similar cupboard is located in the opposite end of the storage room which opens into the physical laboratory of resident inspectors. Storage tanks for the water storing of specimens are also housed in the moist room. Finally, the remaining walls of the room are fitted with galvanized-steel racks which provide storage space for 625 6 in. by 12 in. concrete cylinders.

The chemical-analysis room (Figs. 4 and 5) is fitted with modern steel and stone laboratory equipment. In addition to the usual chemical apparatus found in cement laboratories, this room houses more special equipment, such as the heat-of-solution calorimeter and the Menzel autoclave. Facilities and reagents are maintained for determining the less common constituents of cements, such as phosphorus, magnesia, titanium and alkalies.

The miscellaneous testing room (Fig. 6) includes a small 75,000-lb. compression machine, the briquette-testing machine, a Smidth flour machine, weight-per-liter apparatus, the falling-ball grindability apparatus designed by the Portland Cement Assn., and the Wagner Turbidimeter.

The concrete laboratory (Fig. 7) is equipped with a Lancaster concrete mixer, steel bins for sand and gravel, a 20-in. flow table with remodeling effort attachments, a 200,000-lb. capacity compression machine, and a freezing-and-thawing unit. This unit is specially built and will maintain a temperature of —40 deg. F.

Adjacent to the concrete laboratory is a sample storage room (Fig. 8) provided with steel shelves for storing samples of cement and miscellaneous materials.

The experimental grinding and burning laboratory (Fig. 9) is located in an especially-built room in the plant

Fig. 7. The concrete laboratory.

Fig. 8. The sample storeroom.

Fig. 9. The experimental grinding and burning laboratory.

Fig. 10. The research laboratory.

Fig. 12. Laboratory for visiting and resident inspectors.

Fig. 13. Office of the chief chemist.

kiln building. This laboratory contains the usual small crushing and pulverizing equipment, 2 jar mills, a steel ball-mill 30 in. long and built from the same design as that developed by the Portland Cement Assn. Fellowship at the National Bureau of Standards.

In the research laboratory (Fig. 10) are found the more special pieces of equipment. The apparatus cabinet in this room contains various gages and meters, a potentiometer, an optical pyrometer, thermocouple equipment, and a petrographic microscope with accessories.

Special mention will be made of the microscope because it is believed that

Fig. 11. Dark room.

this apparatus is especially well adapted to cement-clinker studies. It consists of a Bausch & Lomb Model LC petrographic microscope without any objectives. To this stand is fitted a Zeiss epi-condenser, which is attached by means of a tube slide furnished by Zeiss. The epi-condenser has a revolving triple nose piece for which Zeiss supplies a good assortment of objectives for incident or transmitted light with or without the use of cover glass. This condenser has the feature of making possible the use of either vertical or oblique illumination of polished sections without disturbing the focus. The illuminator on the condenser carries a slot for the insertion of color filter plates. A disk of polaroid, especially cut to fit this slot, provides a source of polarized light. A fully-equipped dark room (Fig. 11) contains camera equipment for making photomicrographs.

A long work bench in the research laboratory is fitted with electrical outlets of various voltages, gas and com-

(Continued on page 61)

LEGAL ASPECTS OF THE DUST DISEASES*

By THEODORE C. WATERS
Stockbridge & Waters
Baltimore, Md.

FOR the past several years industry generally has become "dust-conscious" and many lines of business have had to concern themselves with the legal responsibility created by the effect of dust upon the health of employees exposed to this hazard. We have heard and used many terms that are relatively new to most of us, such as "silicosis", "asbestosis", "siderosis", "anthrocosis", and other pneumonoconioses, that have served to create new problems for those responsible for the operation of our great industrial processes.

The term "pneumonoconiosis", of Greek origin, implies a condition of the lungs arising from the inhalation of excessive quantities of dust. Dust is possibly the oldest source of industrial hazard and has been a matter of concern to manufacturers for the past several centuries. To-day the medical profession and industrial scientists tell us of the risk of air-borne diseases and advise us that the pollution of the atmosphere by organic and inorganic dusts is the cause of ill health and premature mortality, chiefly among men and women engaged in trade. Our governmental agencies, Federal and state, have been engaged in making surveys and studies in various industries to determine the effect of dust upon the health of workers engaged in these trades. These agencies, together with organizations of employers and employees, are giving more and more consideration to the problem of the effect of dust upon health, and are attempting to devise and perfect the ways and means to prevent and control dust diseases.

We are told that, to some extent, all dusts are harmful to human organisms, while certain dusts are actively dangerous. The dangerous dusts may be divided into three groups:

1. Poisonous dusts, such as lead, arsenic, etc.
2. Irritating dusts, those that irritate the respiratory tract, causing asthma, bronchitis, etc.
3. Dust producing pulmonary fibrosis, predisposing to respiratory infections, especially tuberculosis and pneumonia.

The last class includes the dust known as "free silica", silicon dioxide, SiO_2, which is the cause of the occupational disease, "silicosis."

When combined with other elements in the form of silicates, silica is comparatively innocuous, but when in its free state, it is perhaps the most dangerous of all dusts. When we recall that over 60 per cent. of the earth's crust is composed of silica, we recognize that it is an element with which we come in daily contact. Its most common form is ordinary coarse sand. You and I breathe silica dust every day of our lives, we eat food containing silica, we have deposits of silica in our lungs. These deposits increase from day to day, and, in the course of a lifetime, the average person accumulates millions of particles of silica in his system. The mere exposure to silica dust, however, does not result in the contraction of silicosis. The dosage must be great and the exposure must be long. The only particles of dust that are dangerous are those of a size less than 10 microns, a micron being one 25,000th of an inch. Even with a dust concentration of millions of particles per cubic foot of air, such dust may be almost invisible to the employee working in such an atmosphere. Medical scientists and industrial hygienists now advise industry that in those processes where the concentration of silica dust exceeds 5,000,000 particles of a size less than 10 microns per cubic foot of air, a dust hazard exists and the workmen engaged in such processes may develop the disease of silicosis.

During the past year it has been my good fortune to serve as a member of one of the committees of the National Conference on Silicosis, sponsored by the Secretary of Labor, and the reports of the various committees of that conference are now in the course of completion and will soon be published. From my own observation and contacts with the members of the various committees, I have come to the conclusion, which I believe to be correct, that *the problem of silicosis in industry has been grossly exaggerated!* By that statement I do not mean to minimize the seriousness of this occupational disease, nor do I mean to condone those industrial processes that create silicosis hazards, but I do believe that there is far less disabling silicosis in our industries than is popularly believed, and that many of the press reports with respect to this industrial problem have incorrectly portrayed the actual conditions that have existed in our industries.

Several years ago a flood of common-law suits spreading throughout the country caused extensive publicity, similarly exaggerated and grossly unfair to many manufacturers. That litigation, costly to all litigants, served the fortunate purpose of proving the inadequacy of common-law procedure to adjust disputes between employer and employee, arising from this type of occupational-disease injury, and, since then, we have seen numerous legislative attempts to provide some other means for the compensation of silicosis injuries.

At the present time, with the legislatures of 43 states to be in session during the present calendar year, and facing the probability that these legislatures will take some action with respect to compensation for silicosis injuries, we recognize the importance of this subject to industry, employer and employee alike, and in considering this problem it would be good to review briefly the legal relationship of employer and employee, and the liabilities imposed upon the employer for the protection of the health of his employees.

Prior to the adoption of the Workmen's Compensation Acts by our several state legislatures, an employee injured in the course of his employment could only recover from his employer for those injuries that could be attributed to the negligence of his employer. The employer was not an insurer of the employee's safety and was not liable for the dangers of the employment, a risk assumed by the employee. The contributory negligence of the employee and the negligence of his own fellow servants were available as defenses to the employer. In cases involving industrial disputes, employees resorted to actions at common law and based their claims for compensation upon the alleged negligence of the employer. This type of litigation proved to be unsatisfactory to both litigants. Such litigation was, of necessity, expensive, the employee retaining counsel upon a percentage basis, and paying for such legal services a substantial part of the jury's award; the employer, being subjected

*Presented at the 1937 Convention, National Crushed Stone Assn.

to jury trials, became the victim of increasingly large verdicts. To eliminate this procedure the Workmen's Compensation Acts were designed and have served a very distinct and useful purpose in adjusting this type of dispute and insuring to the employee compensation for accidental injuries arising out of and in the course of his employment. While our Workmen's Compensation Laws are not perfect, either in their form or in their administration, I believe it is fair to say today that any attempt to effect their repeal would meet with the united resistance of both employee and employer.

The primary purpose of the authors of the Workmen's Compensation Acts was to make the remedy granted thereby the exclusive remedy for injuries suffered by employees during the course of their employment. They eliminated the employer's common-law defenses and made the employers insurers of the safety of their employees for accidental injuries. These laws were originally designed to compensate solely for accidental injuries, that is, those occurring at a specific place, at a specific time, and which would be ascertained and determined coincidentally with the infliction of the injury. They did not purport to provide compensation for occupational diseases. The legal theory existed that the employee assumed the risk of his employment; he knew or should have known of the risk or danger from disease in the particular trade in which he was engaged. To-day, however, we recognize the social need for compensation for occupational-disease injuries just as well as for accidental injuries. On their part, employees are concerned primarily with the fact of their disablement. They are not interested in decisions that legally distinguish accidental injuries from diseases that are occupational. Therefore, we see the gradual imposition upon industry of new and heretofore uncontemplated costs, including the obligation of insuring all employees against the hazards of the usual occurrences and exposures of their work. Our new social order tends to make employers insurers of the health of their employees and the legal and economic effect of such thought is a matter for serious concern.

I believe that industry is ready, willing and able to assume the burden of providing compensation for those injuries occurring to employees as the result of the industrial processes in which the employees may be engaged and which are peculiar thereto. Certainly the honest employer desires to provide such compensation, and that cost should be borne by the particular industry wherein such injuries have been sustained, rather than by the public in the form of charity. On their part, honest employees desire compensation only when they have suffered actual injury and the practical difficulty is to devise ways and means of fairly determining occupational-disease injuries, the extent of disability that arises therefrom, and providing adeqate compensation for those that have suffered such misfortune.

It will be interesting to consider the legal form of the cause of action and the type of testimony that is offered in support of the case of the plaintiff and the case of the defendant in the typical action involving this problem.

The usual form of declaration contains allegations that the defendant manufacturer caused the plaintiff to work in an atmosphere where silica dust existed; that the defendant knew or should have known that certain materials used by the defendant employer contained harmful or dangerous agencies of silica which were destructive to life and health in the human body; that the defendant was guilty of negligence in failing to warn the plaintiff of the danger and in failing to provide the plaintiff with a safe place in which to work or safe appliances with which to work; that thereby the silica became introduced into the plaintiff's lungs and body, causing him permanent injury. The defense pleadings set up the defense of assumption of risk by the plaintiff, the plaintiff's contributory negligence, the negligence of the plaintiff's fellow servants and a general denial of the allegations of negligence as charged by the plaintiff. Upon trial, the plaintiff and his co-workers testify as to the existence of clouds of dust in the working areas; of defective machinery, equipment and industrial processes; of the failure of the employer to warn employees of the dangers; of the failure of the employer to furnish efficient protective equipment such as masks; their industrial engineers expound their technical knowledge and beliefs. Doctors then describe the disease, its insidiousness, the total inability of nature and the medical profession to effect a cure, the prognosis of short life for the plaintiff. The real basis of defense rests in the fact that the plaintiff has failed to prove negligence of the employer as charged in his pleading. In many cases competent medical defense can be offered and reputable doctors will contradict the testimony of the plaintiff's doctors.

It is needless for me to emphasize the seriousness of this type of litigation. Class is arrayed against class. The local press in those places where the causes are tried will carry sensational headlines with respect to the trial, describing the terror of the disease and emphasizing each detail of the complaint against the manufacturer. Suits are filed, not singly, but in dozens. The whole community wherein the industrial plant is located becomes aroused, with the attendant industrial chaos, and by the time the trial day arrives, every citizen of the community is so prejudiced against the defendant that it is almost impossible to procure an impartial trial.

It will be readily seen that common-law procedure is not a satisfactory method for the determination of claims for silicosis injuries. The ultimate solution of the problem of compensation for silicosis injuries must be found in legislation that will remove this dispute from our courts of common law. In the same way that Workmen's Compensation Acts eliminated such actions for accidental injuries, legislation must be devised to eliminate actions for occupational-disease injuries.

Those who have given careful thought and study to the problem of compensation legislation for silicosis injuries have recognized the need of legislation separate and distinct from the mechanism of our compensation acts, with special legislative provisions to deal with many of the intricate problems that silicosis presents. Silicosis injuries differ materially from accidental injuries in that silicosis injuries are the result of the accumulation of injurious substances over an extended period of time in different forms or types of employment, and even under different employers, while accidents occur at a specific time, at a specific place, in a specific way, under a specific employer.

To attempt any detailed discussion of legislative provisions dealing with the problem of compensation for silicosis injuries would consume far more time than is allotted to me at this meeting. However, there are two phases of the problem that I desire to discuss briefly, the first relating to compensation for partial disability, and the second relating to the function of medical testimony in the administration of silicosis compensation legislation.

1. Partial Disability.—In those states now considering legislation to provide compensation for silicosis injuries, industry is and should be concerned with provisions that would compensate partial disability. The basic theory of the Workmens' Compensation Acts has always been to provide compensation only for those injuries that disable an

employee. Several of the leading members of the medical profession who have devoted extensive thought and research to the problem of silicosis injuries have recently advised me that an employee is only materially affected when infection accompanies silicosis and that, in the absence of infection, the employee is probably able to perform his duties relatively as well as prior to the time he suffered injuries arising from the inhalation of silica. I wish to stress the importance and the significance of this fact.

There are many employees to-day who show evidence of injury from the inhalation of silica who are not thereby disabled in any way or prevented from performing the particular duties that may be required of them. Assume, now, that legislation is enacted to provide payment for partial disability. Upon the effective date of that legislation employees showing evidence of silicosis injuries would become entitled to compensation, regardless of their actual disability. You and I both know that the average commission administering compensation laws, in an effort to do justice to the injured employee, would probably award some disability benefits in cases where the medical diagnosis was uncomplicated silicosis. I believe that no substantial injustice would be done in denying compensation to claimants unless their silicosis was accompanied by infection. Such a method would accomplish the desired end in providing compensation only for actual disability, and would eliminate a substantial number of claims that might well harass and embarrass industry.

2. *Medical Testimony.*—One of the most perplexing problems that confronts the lawyer dealing with silicosis claims to-day is to obtain local medical advice with respect to the merit of the employee's claim. There has been, and still is, great misconception and misinformation on the part of certain members of the medical profession with reference to this disease. At the present time I am concerned about the fact that there are not many doctors trained in industrial hygiene and experienced in the diagnosis of silicosis and the determination of disability resulting therefrom. In many of our large industrial states it is almost impossible to procure competent and reliable medical advice, with the result that upon the enactment of compensation legislation employer and employee alike may be subjected to the determination of the medical issues presented by prospective claims by doctors unqualified to pass thereon. Many of the proposed silicosis acts make provision for medical boards or medical referees to advise the administrative agency upon the controverted medical issues presented in the course of hearings on claims. In view of the importance of such testimony, I have always believed that it would be better for each state to set up the mechanism for the creation of a medical board of three members, two of whom should be Roentgenologists, leaving to that board the determination of controverted medical issues and the appraisal of the claimant's disability.

On the legal subcommittee of the National Silicosis Conference I advocated such a recommendation for our committee and, to my disappointment, only two other members of our committee of twelve entertained similar views. I believe that such a board, properly appointed, with the opportunity to give extensive time and study to the problem of silicosis in industry will more efficiently and satisfactorily determine the medical issues of the claimant's case than some other agency, which has presented to it conflicting medical opinions. In other words, if three doctors in a state would be selected and appointed for extended terms, then by their very experience in the administration of the law, they would come to know and to recognize the intricacies of silicosis compensation in a way that would justify public respect for and acceptance of their decisions. If, on the other hand, each case presented to the administrative agency will bring in the testimony of new and perhaps unqualified doctors, I believe that the logical result will be confusion in the decisions of the administrators comparable to that such as we now have when juries attempt to determine similar questions.

I wish, in conclusion, to emphasize what to me seems to be the most important aspect of this problem, namely, prevention. From the standpoint of those who labor they should be far more interested in the maintenance of their health in their particular employment than in compensation for injuries to that health. From the standpoint of employers the cost of prevention of occupational-disease injuries will be but a small fraction of the ultimate cost of compensation for such injuries.

With respect to silicosis, through agencies such as your own, the United States Public Health Service, and other state and industrial organizations in which industry may have confidence, there is available, to you as employers, scientific information as to methods of eliminating most of the silica hazard that exists in your particular industries. If, for none other than selfish reasons, you, as employers, should make use of this information. The initial cost may seem great, but it will many times repay the cost of compensation for silicosis injuries. I do not believe that modern society will countenance the continued failure of many industries to utilize such available methods of engineering control as will tend to minimize the hazard and I hope that in your industrial processes each of you here assembled will renew your interest and activities with respect to your own important departments of industrial hygiene. Labor, for its part, must discharge its duties with full appreciation of the hazards that are present in the particular industries wherein its members are engaged. There must be no half-hearted use of protective appliances with which labor may be supplied. Similarly, there must be no half-hearted enforcement of factory rules and regulations with respect to the use of such appliances. Again, there must be a coöperative observance of rules and regulations that may be laid down by safety engineers or state officials with respect to health conditions in your plants. The problem of health must become a major consideration by all interests involved and I honestly believe that with full coöperation of employer and employee, industry may be well on its way to elimination of this hazard and may relegate the problem of compensation for such injuries to statutory provisions such as the state may deem fit to adopt, reasonable in their provisions, but unnecessary to enforce because of the previous elimination of the hazard.

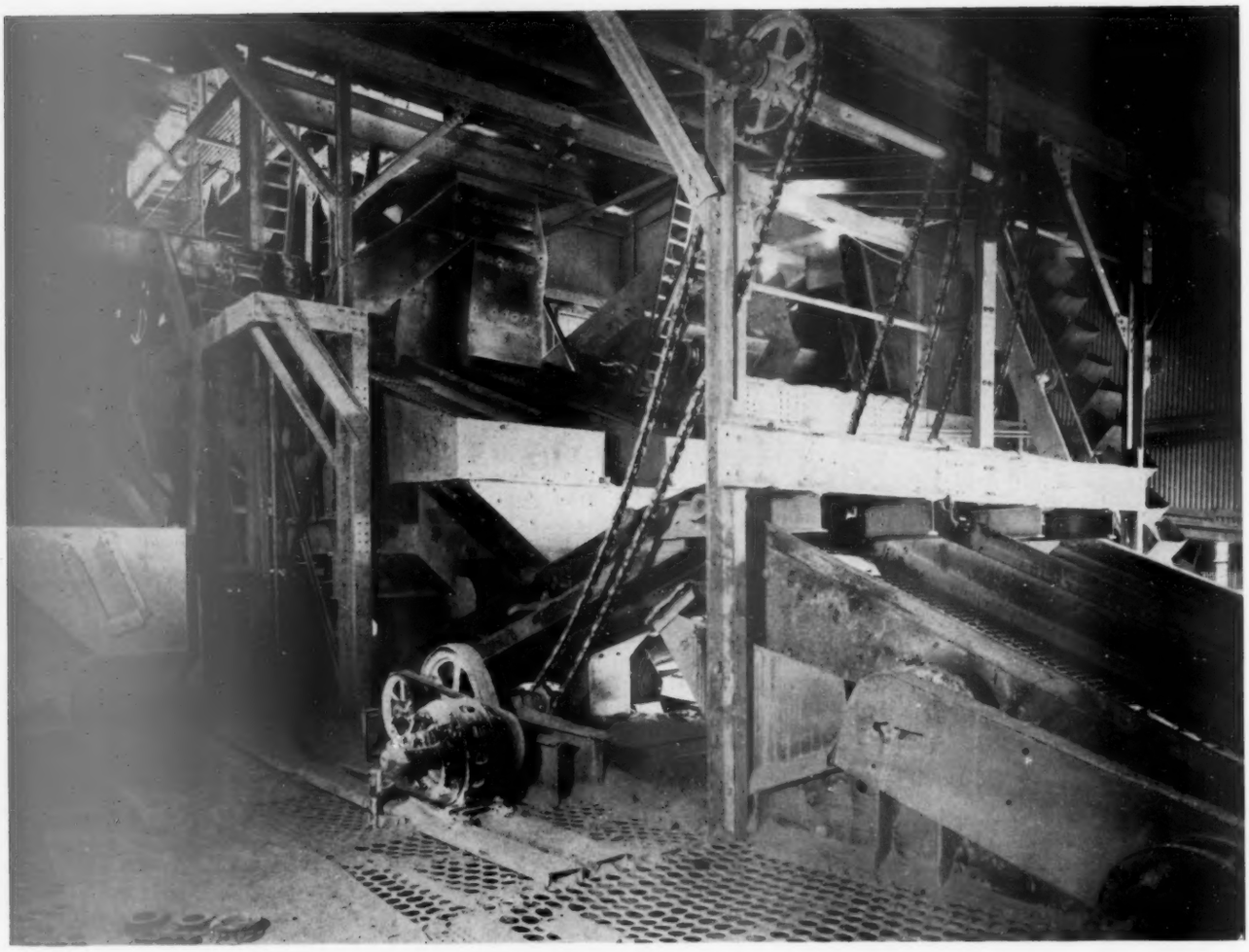
Laboratory *(from page 58)*

pressed-air outlets, and an acetylene and oxygen supply. Various small machine tools are also to be found in the research laboratory which are useful in devising special equipment.

Fig. 12 shows the small laboratory which is maintained for the use of visiting or resident inspectors. This laboratory is chiefly used by representatives of nearby highway departments.

The office of the chief chemist is shown in Fig. 13. J. J. Fox, chief chemist, is responsible for the quality of all manufactured products and the writer as research chemist is responsible for all research work.

The engineering design and supervision of the construction and installation of the equipment involved in the modernization of the laboratory were done by M. C. Addicks, assistant to the operating manager.



Nine large, multiple-deck screens have replaced an assortment of 26 vibrating and revolving screens, lowering power and maintenance costs.

CHANGES AT MARBLE CLIFF'S PLANT B IMPROVE FLEXIBILITY OF OPERATION

THE operations of the Marble Cliff Quarries Co. at Marble Cliff, near Columbus, O., are among the largest in the nonmetallic-minerals industries. Almost every product made from limestone is produced. These operations include Plant X, which produces primarily flux for steel mills, Plant B, which produces ballast, commercial crushed stone, stone sand and some flux, a rotary-kiln lime plant, and an aggregate-bituminizing plant.

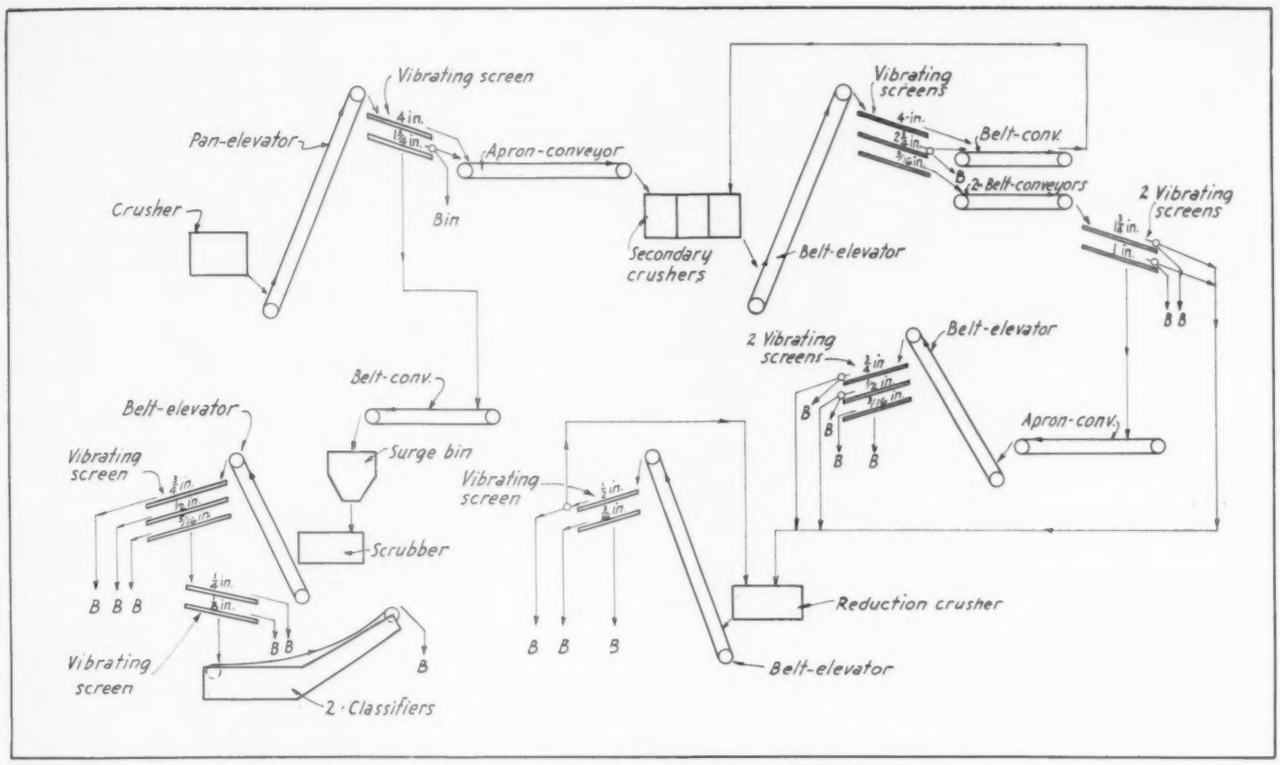
What is really notable about these operations, however, is the manner in which they have been kept up-to-date. It is the company's policy to replace obsolete or worn-out equipment with the latest and most efficient machinery in order to improve the quality of its product and to lower its production costs. This policy has led to the frequent making of improvements and extensions to the company's large production facilities. Plant X was rebuilt new above the bins in 1931 and other changes have been made since. This plant now produces 450 tons of flux per hr. The lime plant was built in 1924 but has undergone considerable improvement; the latest additions to this plant are two Raymond direct-firing bowl mills which serve the two rotary kilns. This plant produces over 170 tons of lime in 24 hr.

Plant B, with which this article is concerned, has been through three major and two minor improvement programs in the last ten years. The latest and most drastic of these was completed in 1936. This plant now has a capacity of 400 to 600 tons per hr., sized and graded into commercial stone products to meet an almost infinite range of market demands.

By W. E. TRAUFFER

Primarily the purpose of the latest improvements to Plant B was to provide increased capacity for making small sizes of stone while maintaining facilities for the production of the larger sizes. A secondary purpose of these improvements was to provide complete flexibility for producing a large variety of sizes, and of apportioned mixtures where required. With the new arrangement small orders of odd sizes of rock can be filled profitably without the necessity of changing screen cloths and interfering with the production of other sizes.

The new lay-out also resulted in important economies in power and maintenance costs. Through new opportunities afforded by the Robins Con-

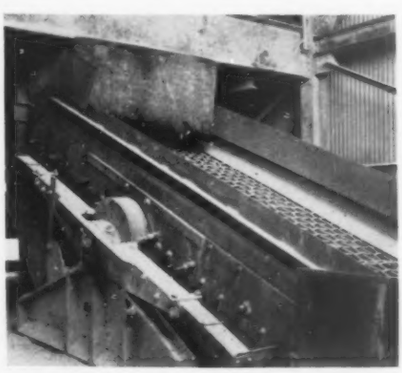


Flow-sheet of present operations at Plant B.

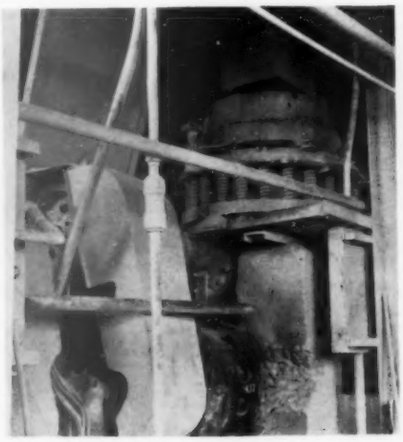
veying Belt Company's development of large-size, multiple-deck Gyrex vibrating screens nine screens replaced an assortment of 26 vibrating and revolving screens and provide increased capacity and efficiency. As an example, in the primary section of the plant one Robins Gyrex screen replaced two 84-in. by 24-ft. revolving screens. This change resulted in saving 85 hp. for driving screens and also did away with three belt-conveyors which required an additional 15 hp. The saving in maintenance is obvious.

When built about 25 years ago, this plant had only revolving screens. In 1920 2 more revolving screens were added for washing, and in 1923 these were replaced with 8 conical screens. In 1927 3 revolving screens were replaced with 3 Robins cataract grizzlies, 3 Robins Roco and 4 Robins Vibrex screens. Two Symons cone crushers, one 4-ft. and one 5½-ft., were also installed along with the necessary belt-conveyors and bucket-elevators to recirculate the crushed stone. In 1930 the grizzlies and Roco screens were replaced by 5 more modern and efficient Robins Gyrex screens.

In the 1936 modernization program the remaining revolving screens and all except two of the vibrating screens were removed. The two 84-in. by 24-ft. revolving scalping screens were replaced by one new Robins Gyrex 6-ft. by 14-ft. double-deck screen. A Robins Style B Mogul Gyrex 4-ft. by 8½-ft., single-deck screen following the secondary crushers and another similar screen from Plant X were converted into 4-ft. by 10-ft. triple-deck screens, equipping them with new live frames and changing to shorter stroke and higher speed to adapt them to fine grading. Two Gyrex 4-ft. by 10-ft. double-deck screens following these, of the former equipment, were not moved. Two new Robins Gyrex 4-ft. by 12-ft. triple-deck screens replaced the 2 smaller Gyrex 4-ft. by 8½-ft., double-deck screens and the 4 Vibrex 42-in. by 60-in. single-deck screens which had been installed several years before. In the washing section the 8 conical screens were replaced by a Robins Gy-



The 6-ft. by 14-ft. single-deck screen.



The 4-ft. cone-crusher with V-belt drive.

Speed reducers on log-washers (Plant X).

Elevator and two 4-ft. by 12-ft. triple-deck screens.

rex 5-ft. by 14-ft. triple-deck screen followed by a Style A Gyrex 4-ft. by 8½-ft. double-deck screen taken from another location.

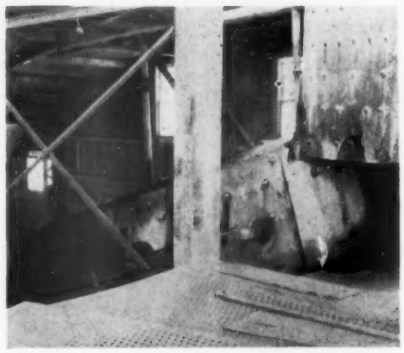
In the quarry a 30-ft. ledge of blue limestone supplies the crushed stone and ballast. Under this is a 42-ft. ledge of white limestone which is used for flux. A Marion Type 4160 electric shovel with a 4-cu. yd. dipper was purchased in 1929 and is now used for loading fluxing stone. The company also has a number of older Marion steam shovels, of which three or four are also used for loading. Stripping is done with a Lima 101 shovel and an Ohio 1-cu. yd. shovel, both gasoline-powered. The company owns 20 steam locomotives, of which about 16 are generally in use at one time. Cars of 6-, 12-, 16-, and 20-cu. yd. capacity are used. The haul to the foot of the incline at Plant B is about 3 mi.

At Plant B two hoists driven from the same 125-hp. electric motor haul the cars of stone up a double incline. The stone is dumped into the No. 21 Allis-Chalmers McCully primary crusher which is set at a 6-in. opening. A Jeffrey pan-elevator on 100-ft. centers takes the crusher product to the scalping screen. This elevator has buckets 54 in. wide supported on double strands of 30-in. pitch chain and is driven by a 125-hp. motor.

The 6-ft. by 14-ft. scalping and ballast screen.

The primary scalping screen is a Robins Gyrex 6-ft. by 14-ft. double-deck unit with 4-in. clear openings on the top deck and 1¾-in. on the bottom. The material passing through the bottom deck of this screen drops on a conveyor running to the scrubber. The stone retained on the bottom deck of this screen can be chuted direct into a bin as flux stone or dropped with that retained on the top deck on a Jeffrey 36-in. by 35-ft. pan-conveyor, which feeds two Allis-Chalmers No. 8 gyratory crushers. The minus 3-in. product of these crushers is discharged on two 30-ft. pan-conveyors which feed a 40-in. by 80-ft. belt-bucket elevator. The stone is discharged through a split chute to the two Robins 4-ft. by 10-ft. triple-deck screens having 4-in., 2¾-in., and 3/16-in. openings. The dust is removed in this first dry sizing operation to allow subsequent washing of the larger sizes, if desired, without the complication of fine-stone recovery or waste.

The material retained on the middle deck can be discharged into a bin or,



A view of the new washing screen.

when the 2¾-in. by 4-in. bin is full, joins the oversize material from the top deck on a 36-in. belt-conveyor running to a Symons 5½-ft. cone crusher, which reduces it to ⅞-in. minus. Being in closed-circuit arrangement, the same 80-ft. elevator returns this material to the screens. The minus 3/16-in. material passing through the bottom deck of this screen can be discharged into a bin or on the conveyor running to the scrubber mentioned above, or on a 24-in. conveyor feeding a truck-loading bin.

The material retained on the bottom deck of these first two sizing screens is carried on a pair of short belt-conveyors to the two Gyrex 4-ft. by 10-ft. double-deck screens. These have 1¾-in. and ⅞-in. openings. The materials retained on both decks of these screens can be discharged into separate bins or, when these are full, can be combined in a chute feeding a 4-ft. Symons cone reduction crusher.

The material passing through the bottom decks of these screens is carried on a 36-in. apron conveyor to a 36-in. belt-bucket elevator feeding the two Gyrex 4-ft. by 12-ft. triple-deck screens. These are fitted with $\frac{7}{16}$-in., $\frac{5}{16}$-in., and ⅛-in. cloth. All four of the products of this screen can be discharged into bins, or, if desired, the

Pan-conveyor in Plant X carries minus 2½-in. material from two vibrators.

(Continued on page 66)

Editorial heads of nearly a score of the nation's leading business papers posed for the picture at the right while at Peoria.

Industrial Editors Learn About Home Life of the Caterpillar

AN invitation to visit the plant of the Caterpillar Tractor Co. brought 17 business-paper editors to Peoria, Ill., on November 1 for a two-day Editors' Party. The invitation was extended only to the editors of the papers that carry Caterpillar advertising.

After their arrival in Peoria the visitors were taken to the Caterpillar proving grounds, where Caterpillar Diesel tractors and road-building machinery are subjected to the kind of treatment they receive in actual service. Travel over extremely rough ground, pulling Auto-Patrols and elevating graders, hauling Le Tourneau Carryall scrapers and Athey dump wagons, and pushing land and trees from the hillside with bull-dozer equipment were some of the tasks demonstrated to the interested editors. Some of the editors drove tractors to see how they perform even in unskilled hands.

At the dinner that evening the guests met the executives and department heads of the Caterpillar organization, and were later entertained by a floor show.

After breakfast the morning of the second day was devoted to guide-conducted tours through the apprentice school, the engineering and tool-design rooms, the laboratory, and the factory. Inventory was in progress, so neither the machines nor the company's 11,000 workers were busy. Nevertheless, there was opportunity for audible discussion of the processes used and the unremitting care exercised to insure the maintenance of precision and uniform quality standards. Thousands of feet of motion-picture films, portraying the use of Caterpillar products in many different fields, were shown in the Caterpillar Theater that afternoon. At the conclusion the editors left for their homes, grateful to the Caterpillar organization for a well-arranged visit and a fine example of hospitality and much better informed about the causes that have made their company-host a $50,000,000 corporation, whose products are being used in every country of the world, uncivilized as well as civilized, and in every industry where difficult hauling and handling problems exist.

Picking up a load.

Dumping the load.

Taking the bumps.

Making a dynamometer test.

The following persons were present at the editors' dinner:

Caterpillar Organization

B. C. Heacock, president; A. T. Brown, vice-president; J. V. Munro, vice-president in charge of purchasing; C. O. Wold, vice-president in charge of road machinery plant.

G. M. Walker, advertising manager; E. W. Jackson, general service manager; L. B. Neumiller, director of industrial relations; J. D. Fletcher, assistant general sales manager; G. A. Bahler, general traffic manager; W. H. Radford, assistant chief engineer; W. E. Bergstrom, general auditor.

H. H. Howard, manager, engine

sales division; E. B. English, manager, governmental sales; H. M. Hale, sales manager, eastern division; F. G. Nunnelley, Canadian sales manager; H. R. Murphy, manager, sales development; F. A. Nikirk, sales department; O. Q. Hinds, road-machinery sales; P. C. Smith, advertising department; W. A. Harper, superintendent, proving grounds; William Ogden, sales department; H. H. Honnen, sales department; O. E. Hughes, special representative.

Guests

John C. Black, Chicago, Ill., *Roads and Streets;* Ovid Butler, Washington, D. C., *American Forests;* Edgar R. Curry, Chicago, Ill., *Ice & Refrigeration;* Newton C. Evans, Chicago, Ill., *American Miller;* Roy Fellom, San Francisco, Calif., *Pacific Roadbuilder & Engineering Review.*

R. B. Gress, Little Rock, Ark., *American Ginner & Cotton Oil Miller;* H. E. Hollensbe, St. Joseph, Mich., *Industrial Power;* S. F. Horn, Nashville, Tenn., *Southern Lumberman;* Elmer T. Howson, Chicago, Ill., *Railway Age;* Theodore Reed Kendal, New York, N. Y., *Contractors & Engineers Monthly—American City.*

B. L. Knowles, Worcester, Mass., *The Constructor;* E. J. Macintyre, Toronto, Can., *Engineering & Contract Record;* L. H. Morrison, New York, N. Y., *Diesel Power;* C. M. Nelson, Chicago, Ill., *Better Roads.*

S. A. Phillips, Chicago, Ill., PIT AND QUARRY; Dudley Reed, Milwaukee, Wis., *Excavating Engineer;* Rex W. Wadman, New York, N. Y., *Diesel Progress.*

Marble Cliff *(from page 64)*

materials retained on the two top decks can be sent to the 4-ft. Symons cone crusher for further reduction.

The 4-ft. Symons cone crusher is usually set at a ½-in. opening. A short 30-in. belt-conveyor feeds the crusher product to a 32-in. by 75-ft. belt-bucket elevator which discharges it on a 4-ft. by 10-ft. double-deck Gyrex screen having $\frac{7}{16}$-in. and ⅛-in. openings. The three products of this screen are usually discharged into bins, but the material retained on the top deck may be returned to the 4-ft. Symons cone crusher for further reduction.

Turning from the dry operation to the wet, the material that passes through the 1¾-in. bottom-deck openings of the primary 6-ft. by 14-ft. Gyrex screen is sent to the washing department for the removal of possible quarry dirt and clay. It goes by a 30-in. belt-conveyor running to a surge bin from which it is fed to an Allis-Chalmers rotary scrubber, discharging on a 30-in. belt-conveyor feeding a 30-in. by 75-ft. belt-bucket elevator. The elevator delivers this material to the Robins Gyrex 5-ft. by 14-ft. triple-deck washing screen, equipped with sprays and having ⅞-in., $\frac{7}{16}$-in., and $\frac{5}{16}$-in. cloth openings. The material retained on the top deck is discharged into a bin as railroad ballast. The materials retained on the other two decks are combined into one bin as No. 46 road stone. The material passing through the bottom deck goes to the Robins Gyrex 4-ft. by 8-ft., 6-in. double-deck screen having $\frac{3}{16}$-in. and ⅛-in. cloth openings. The materials retained on the two top decks of this screen are also discharged into the No. 46 road-stone bin. The fines and the water passing through the bottom deck are split to a pair of drag-type classifiers which produce masons' sand. When torpedo sand is desired, the ⅛-in. by $\frac{3}{16}$-in. material can be combined with the drag product and put into another bin.

There are 15 steel storage bins with capacities of 60 to 70 tons each under these screens and drags. Mixing gates in the chutes and distributing conveyors make it possible to blend any desired gradation or mixtures of materials into these bins for car or truck loading.

The crushers are set as stated above for the maximum production of ½–in. stone. When there is a demand for larger sizes, the 5½–ft. cone crusher is opened to 1½ or 2 in. Sometimes there is a special demand for 4–in. rock, in which case the 5½-ft. cone crusher is opened to any opening from 2 in. up to 4 or 5 in. Then the 5½-ft. cone crusher is used only to crush the oversize material from the scalping screen and any other large sizes not in demand, leaving the two No. 8 gyratory crushers for such finer crushing as is required. When No. 46 road stone is in demand the 4-ft. cone crusher is set at ⅜ in. and ballast is crushed down to ½ in.

The Robins Conveying Belt Co. furnished all the new screening equipment and made lay-out drawings in collaboration with Robert Pausch, secretary and chief engineer, and E. H. Humberstone, general superintendent and staff, of the Marble Cliff Quarries Co., under the supervision of Mr. Humberstone and his assistants, R. W. Bowen and Albert Wilson. The Marble Cliff company fabricated and erected all the structures and chutes and installed and put in operation all the mechanical and electrical equipment.

New Tennessee Tripoli Plant Starts Shipping

Initial shipments of ground tripoli have just been made by the McCall Mining Co., of Huntingdon, Tenn., from its new processing mill near Parsons in Decatur County. This production of tripoli, a heretofore unexploited resource of western Tennessee, marks the third prominent development in the mineral industry of that area in the current year, as in March a bleaching-earth mill was completed at Paris and in October a molding-sand blending-mill was placed in operation near Camden. This latest operation is the result of several years investigation of the tripoli deposits of western Tennessee by W. C. McCall, who, with George T. McCall, owns and operates the new mill.

Selection of the present site in Decatur County was made because of the extensive deposits available here under favorable mining conditions. The tripoli, a soft yet coherent fine-grained white type, occurs in massive deposits possibly 100 ft. or more in depth.

The present mining site is on the George Crosby farm, 3.5 mi. east of Parsons alongside a deep cut of State Road 20, made almost entirely through tripoli. Estimates made by an official of the Tennessee Division of Geology indicate that at least 50,000 tons of tripoli can be recovered above drainage at the point of present mining, with practically unlimited tonnage available in extensions of this hill. Some 1,200 acres of adjacent tripoli-bearing land are under lease by the McCall company.

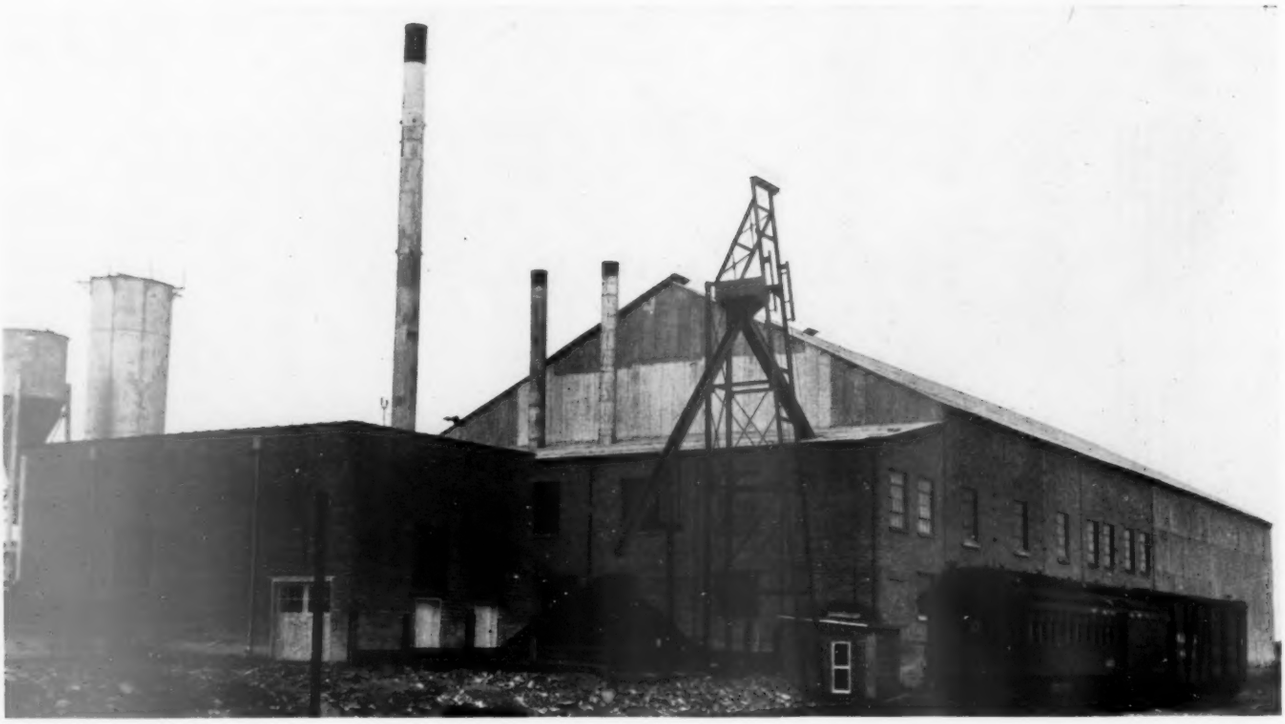
The processing mill consists of a 4½-ft. by 24-ft. rotary drying kiln, revolving screens with ¼-in. mesh cloth, a 5-ft. by 12-ft. tube-mill, a Raymond mechanical separator, and accessory conveyors. All the equipment is powered by a 60-hp. Diesel engine. Heat for drying is generated by an oil-burning kiln.

The lump tripoli, as delivered from the mine, is dried in its pasasge through the rotary kiln and then goes directly to the rotary screen, the oversize being returned to the tube-mill for grinding, while the screened, ¼-in. or lesser size material, goes to the separator which removes all 300-mesh or smaller sizes, returning the oversize to the tube-mill for further grinding. The tube-mill product goes direct to the separator for final classification. This system of grinding reduces the load of fines in the tube-mill.

The finished product of the mill can be classified to 99.75 per cent. through 300-mesh, a high degree of fineness.

P AND Q
PROFITABLE
New Products
SECTION

Large, Modern Structure Houses New Mineral-Wool Plant



The plant of the Superior Rock Wool Co. at La Gro, Ind. In the foreground are the boiler-room building and skip hoist which handles coal and coke. The two cupola stacks are seen rising from the main plant structure.

FAITH in the future of the mineral-wool industry is concretely expressed by the Superior Rock Wool Co., which is just completing at La Gro, Ind., one of the largest and most modern plants of this type in existence.

The Superior plant, a two-cupola project with provision for ultimate enlargement to six cupolas, is housed in a building which is made of hollow-tile and corrugated steel with reinforced-concrete floors and is 250 ft. long and 84 ft. wide. It is 54 ft. high at the roof peak and 33 ft. at the eaves. Located on a limestone formation, which is ideally suited because of its acidic-basic balance to the manufacture of rock wool without the addition of spar or other fluxing agents, its raw materials are close at hand and the supply is abundant.

R. W. Ross, general manager of the company, and Howard A. Pottenger, superintendent, were formerly connected with the National Rock Wool Co., also of La Gro, whose plant is located about ¼ mi. eastward. Construction of the new plant was started in March of this year and a test run was made late in October, both cupolas blowing wool of high quality into the annealing-and-collection chambers. The batt-forming and cutting machinery is now being assembled and installed and full production is expected to get under way shortly after the first of the year.

Typical of all mineral-wool plants and of any new industry that has had a rapid rise, the equipment for the Superior plant was designed by the company's own engineers, in this case Messrs. Ross and Pottenger. Both cupolas were fabricated to specifications at Indianapolis, as were the moving floors of the blow-rooms or collection chambers, the granulator machine, and the batt-making equipment. Much of the last-named machinery is being cut, welded and assembled on the floor of the plant building.

For the time being an old quarry about 1¼ mi. from the plant will provide the wool rock, Ford trucks with a capacity of 4 tons hauling the material and dumping their loads directly on the charging floor. Later on the owners expect to open a quarry adjoining the plant and will erect storage facilities for the stone between the eastern end of the building where the cupolas are situated and the boiler-room building.

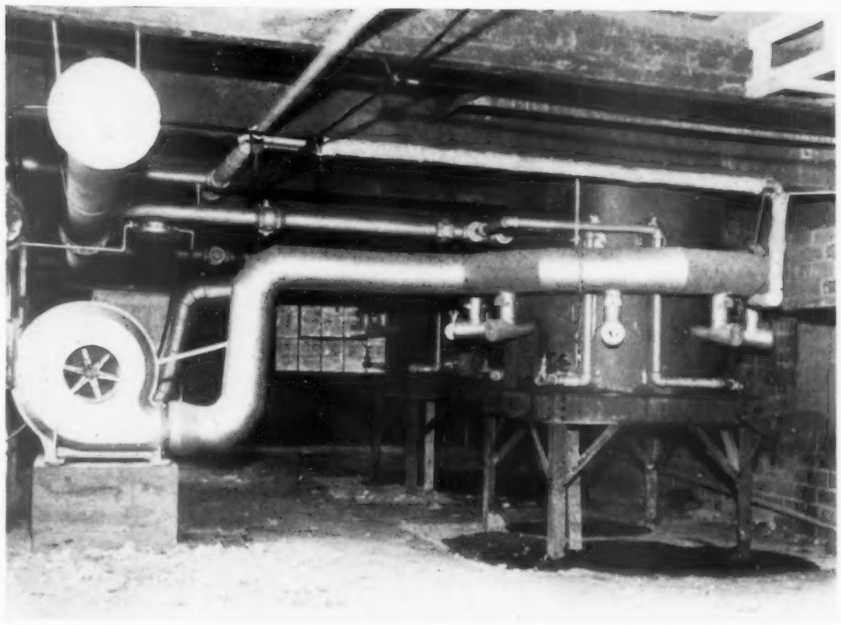
The plant is located on a spur of the Wabash Railroad and coal and coke are delivered in bottom-dump cars which discharge into a pit. A skip-hoist raises the fuels and dumps them into either of two chutes, the coal going to the boiler-room and the coke to the coke bins on the charging floor.

Both the stone and the coke are charged into the cupolas by hand. Pieces of stone 10 in. in size or larger are sledged to smaller sizes and alternate layers of stone and coke are shoveled into the cupola after the fire has been started and kept full to the charging-door level until the completion of a run. Air for the blast is supplied by two No. 6 Sturtevant fans, one on each cupola, the air entering the furnaces

through tuyeres arranged radially around the cupola near the bottom.

As the molten stone runs from the tap-hole at the bottom of the cupola it is met by a blast of steam blown from a V-shaped nozzle at a pressure of 110 lb. This forms the fibers, and the mass of wool is blown into the collecting chamber. There is a chamber for each cupola, each being 32 ft. high, 8 ft. wide and about 35 ft. long. At the blowing point a fine stream of high-flash-test paraffin oil is introduced to make the wool dustless and improve its handling and packing qualities. Each cupola has a capacity of about ½ ton of finished material per hr.

The floors of the collecting chambers are built of narrow steel flights which move away from the cupolas slowly, somewhat in the manner of a belt-conveyor. The sides and top are of corrugated steel. The rock wool comes off these endless moving floors throughout the run, and the speed of travel of the floor can be regulated to obtain any desired thickness of the layer of wool as it emerges. If loose wool is being produced it is packed in paper bags immediately. For making the granulated product, the wool as it drops from the moving floor settles on a cross belt-conveyor, which carries it to the granulating machine off at one side of the building. When batts are to be manufactured, the wool is fed into the batt-making machines, which are arranged for straight-line production as a continuation of the collection-chamber floors. The batts, covered with heavy paper, are cut into blocks by circular saws on the batt machine and are packed in cardboard cartons for shipment.



Bottom of the cupolas where the wool is blown into collection chamber through opening at extreme right. Blast fan at left.

A view of the charging floor with pile of wool rock and coke supply at rear.

About one-third of the building at the western end will be utilized as a storage warehouse and later on will be floored into three levels.

Water for the boiler-room comes from driven wells, and centrifugal pumps lift it to two elevated steel storage tanks. The cupolas are water-jacketed since no refractory lining has been found which will satisfactorily withstand the high temperatures which may reach or exceed 3,000 deg. F. After serving as cooling water for the cupolas, the water thus pre-heated is returned to the boiler-room to produce steam for blowing the wool.

A smaller building is also under construction at the present time adjacent to the main plant. It will be utilized as a laboratory and for the blending and storage of oils and chemicals used in treating the wool when it is formed into batts.

Liability (from page 54)

credit memorandum testified that the price of 20c. per ton for unloading sand and gravel, as shown upon the memorandum, was not authorized by his superiors, and that he had no direction from his superiors in reference thereto. On the other hand, witnesses for the gravel company testified positively and in no uncertain terms that the contractor agreed to unload the sand and gravel at shipping destination for 10c. per ton.

In view of the fact that the contractor produced no witnesses to testify that he was to receive 20c. per ton for unloading the sand and gravel, the higher court held the contractor entitled to only 10c. per ton, and said:

"Under the law the burden rested upon appellee [contractor] to show that he was to receive 20c. per ton for unloading sand and gravel, and, as we view this record, appellee [contractor] not only has failed to perform this burden of proof, but, on the contrary, the great weight of the testimony is that the contract price was 10c. per ton for unloading."

Another important point of the law was decided in this case. The contractor contended that the weights as sub mitted by the railroad were erroneous to the extent of 1,600 tons, due to the fact that the railroad company adopted an estimating system in calculating weights instead of actually weighing the sand and gravel on scales. However, it is interesting to know that the higher court held the estimated weights, arrived at by the railroad company, by measurements, to be correct, and said:

"It suffices to say that we have carefully read and considered all the testimony on this issue, and we find that the weights as certified by the railroad company were substantially correct."

Silicosis Danger Voiced at Engineers Meeting

The danger of permitting persons showing traces of tuberculosis to work in silica dust was voiced by industrial disease specialists at a safety engineering conference held at Pittsburgh on Nov. 4.

"Silica is a fertilizing agent for the tuberculosis germ," Dr. Paul G. Bovard, Tarentum, Pa., declared. "Silicosis itself is seldom fatal, but it usually kills through other diseases."

Dr. C. Howard Marcy, director of the Tuberculosis League of Pittsburgh, said that the best way of preventing silicosis was to keep silica dust from the employees' lungs, and discussed practical devices now on the market for controlling dust.

The Prevention and Treatment of Rash Known as "Cement Itch"

Prolonged contact with Portland cement caused a severe skin afflication to break out among the members of the laboratory staff of the U. S. Bureau of Reclamation at Grand Coulee Dam in the state of Washington recently. Having had no experience with the disease or its treatment, Major S. E. Hutton wrote PIT AND QUARRY for help. The problem was referred to Dr. C. O. Sappington of Chicago, consulting industrial hygienist, who transcribed the following which was immediately sent to Major Hutton at Grand Coulee:

"So-called 'cement itch' is a rather common minor trouble among various kinds of cement workers. For the protection of the skin, there are three general procedures which are found to be of benefit:

"1. The first method of preventing cement dermatitis or irritation of the skin is frequent bathing or washing; the exposed parts of the body and also the forearms should be washed thoroughly with plenty of warm water and soap to remove the cement dust or whatever may adhere to the skin.

"2. Protective clothing is an important item in effective prevention of skin trouble due to cement exposure. Gloves and long sleeves should be worn if possible. The trousers should be tied securely about the shoe tops, so that the dust will not sift in. The clothing should be kept dry and washed frequently.

"3. The third procedure is that of using an ointment which may be used either as a protective coating or as a compound which will replace the loss of natural oil from the skin by frequent washing or by exposure to cement dust or both. The ointment which has been found of help is as follows:

Gum tragacanth	1 part
Lanolin	3 parts

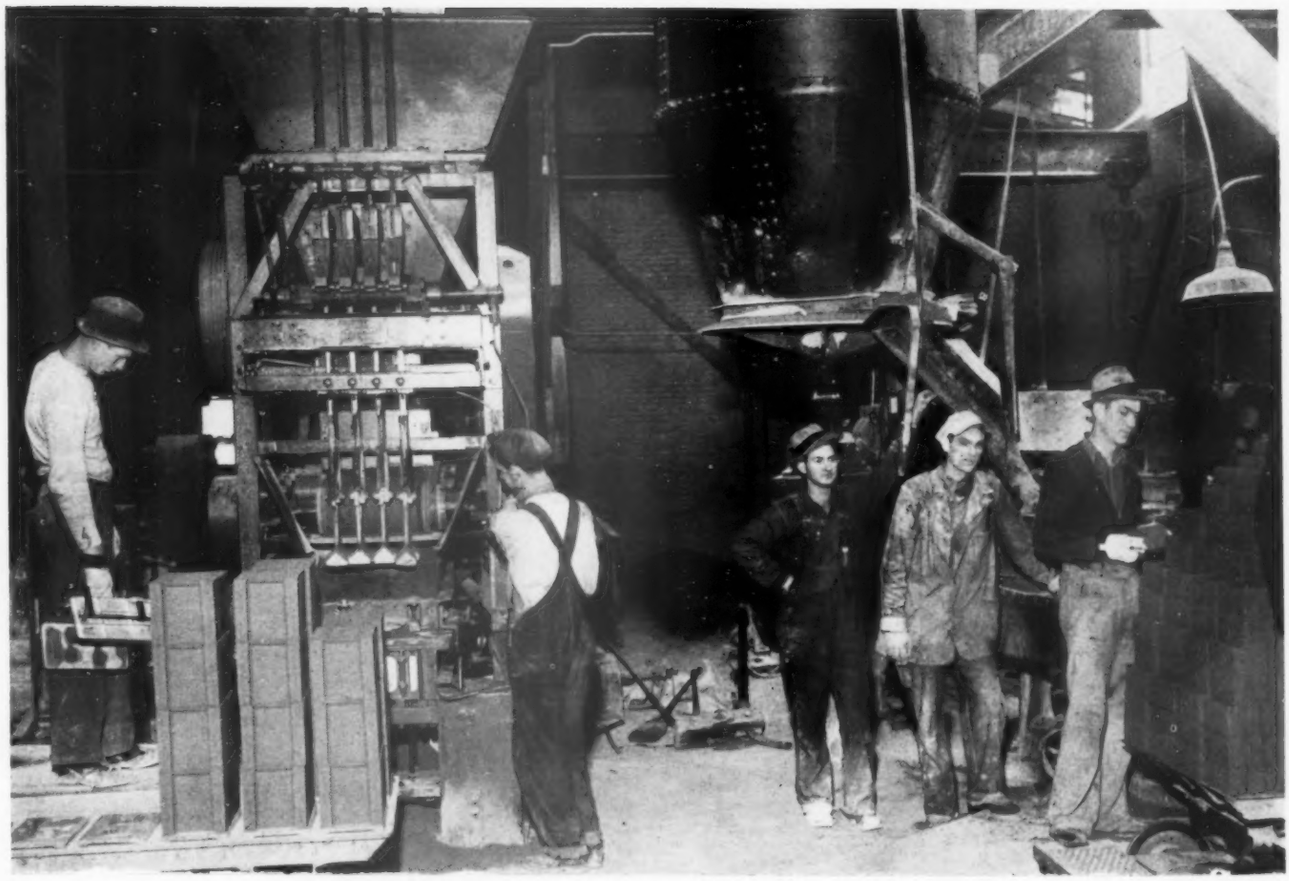
"The gum tragacanth should be mixed with water to the consistency that it will drop easily from the mixing knife. The lanolin may then be thoroughly incorporated with the gum tragacanth and the ointment is then ready for use. The ointment should be smeared on easily to the exposed parts, or merely used as a dressing after washing. Where it is possible to use gloves or full-length sleeves, the ointment can be used during working hours. It is a good idea to apply the ointment to the ankles and legs, particularly if porous clothing is worn and there is a great deal of cement dust in the air. The ointment is easily soluble in water and can therefore be washed off before meals, or by a full bath at the end of the day.

"It is to be understood that the use of this ointment is not curative — where irritation has taken place and there is a real dermatitis present, the cases should always be referred to a physician, preferably a dermatology specialist, since other treatment may be indicated than that which I have indicated here. It should be emphasized that the procedures outlined above are those which can be easily used as preventive procedures and are not to be interpreted as curative in any sense.

"The action of cement on the skin because of its extremely alkaline character dissolves the natural oil which ordinarily protects the skin from irritating influences and keeps it in a smooth, natural condition. Any substance which tends to dissolve the natural oil of the skin causes it to become, first dry and cracked, and from then on, the lesions assume the aspects of a chemical dermatitis."

In connection with skin afflications of this type, Dr. R. R. Sayers, chief of the Division of Industrial Hygiene, U. S. Public Health Service, cites some sources of information on the subject. These include *U. S. Public Health Bulletin No. 176*, now out of print but available through medical libraries; U. S. Public Health Bulletin No. 229, *Skin Hazards in American Industry*; the brochures of the Occupational and Health Series published by the International Labour Office, Geneva entitled *Cement and Lime*, which are available through the organization's Washington, D.C. office; and *The Dermatergoses or Occupational Affections of the Skin*, by R. Prosser White, published by H. K. Lewis & Co., London, 1934.

"From these sources," says Dr. Sayers, "it would seem that attention should be given to good-housekeeping, personal hygiene, and cleanliness of clothes. Medical treatment should be under the direction of a physician acquainted with the working conditions as well as with the disease."



The new block press in operation with the sand-lime-brick machine at the right.

PIONEER BRICK MAKER ENLARGES SCOPE OF OPERATIONS WITH SAND-LIME BLOCK

By HARRY F. UTLEY

FOR nearly ten years the Northern Indiana Brick Co. has been producing sand-lime bricks at its plant located on the outskirts of Mishawaka, Ind. Recently the company expanded its facilities so that it is now also producing sand-lime blocks, which are readily being accepted by the building industry of South Bend and its vicinity as well as in the Chicago area. These units, produced on a new Jackson & Church press, are made in the same sizes and shapes as the conventional concrete blocks and, due to the economies of production, can be sold at the prevailing price of the latter, about 14c. per unit.

The new block press has a capacity, proved by operation in this plant, of 250 units per hr. It operates side by side and in conjunction with the Jackson & Church No. 12 brick machine. The block press, a strip machine, makes one unit at a time. Vertical cores are employed, and the blocks, ejected upward from the mold box, are handled by a special light-weight holder by the man at the machine and arranged in tiers from three to five high on a narrow-gage hand truck. Because of the extremely heavy tamping in the press, the blocks are unusually dense. No pallets or racks are needed, the only pallet used being the one permanently on the table of the press. This results in considerable savings in the initial cost of equipment.

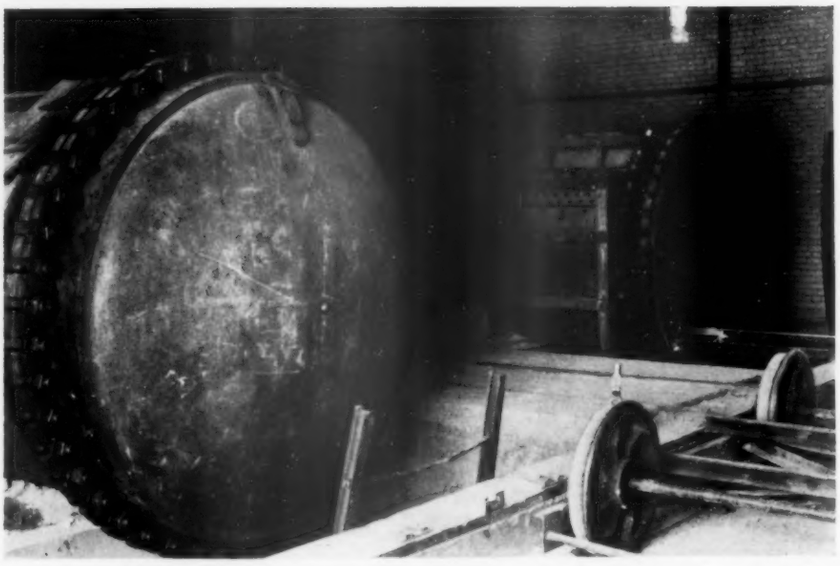
The hand trucks, also used in handling the output of the brick machine, are rolled when loaded onto a transfer car which hauls them to either of two cylindrical hardening cylinders 87 ft. long and 7 ft. in diameter. When filled, the ends of the hardening cylinders are closed and sealed and the steam is turned on. After curing under steam pressure of about 100 lb. per sq. in. for a period of 8 hr. the completely-cured, pre-shrunk units are removed.

While yard storage is usual, the sand-lime units can be shipped for delivery immediately after they are removed from the hardening cylinders. There is no further shrinkage and in heavy-production seasons it is, therefore, unnecessary to carry large stocks in storage. The binding medium—lime—is relatively inexpensive and the company is quite enthusiastic over the active demand that has been built up for the new blocks and in the profit possibilities of the product.

The brick plant was completely described soon after it went into full production (*P & Q*, Jan. 15, 1930, p. 61) and a brief resumé of the production of sand and the processing of the materials (sand and lime) before reaching the block and brick presses will suffice. The property consists of 27 acres, and sand is excavated by a drag-scraper from a pit located about 25 yd.

north of the plant. It is carried by a belt-conveyor to the second floor of the plant structure, the coarse material is screened out and the sand chuted to a steel bin over the Jackson & Church Volumeter, which proportions the sand and the lime in a ratio of about 1 part of lime to 6 parts of sand by volume. High-calcium hydrated lime is received in cars and elevated to another steel bin over the Volumeter. Rocker feeders proportion the sand and lime, with only a small quantity of water added, on two short converging belt-conveyors which form the Volumeter, and the materials are discharged into a Jackson & Church rod-mill located in a pit below ground-level. The rod-mill, powered by a 50-hp. General Electric motor through a Texrope drive, grinds the sand and intimately mixes it with the lime. A cleated belt-conveyor raises the finished mixture to separate hoppers over the new block press and the brick press. A small amount of water is added before pressing the bricks, but the block machine utilizes the material in a somewhat drier state because of its advanced design and heavier tamping ability.

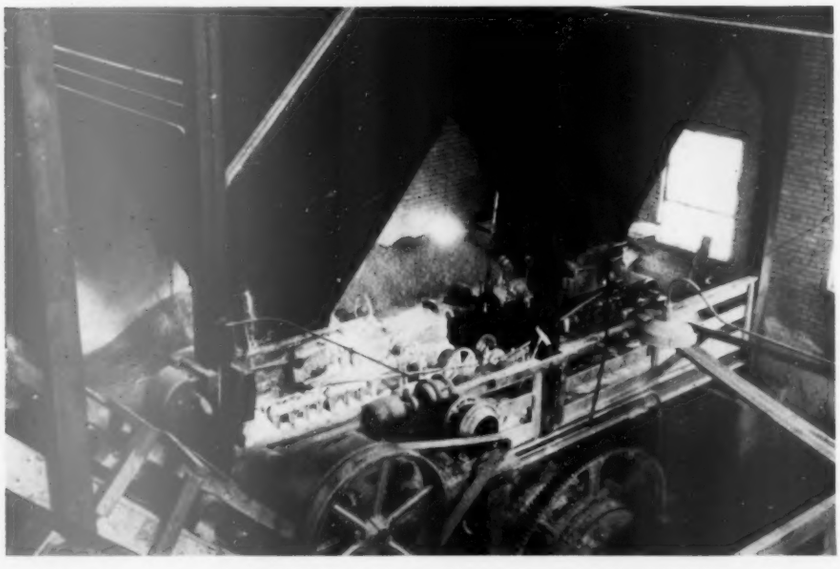
The Northern Indiana Brick Co. is headed by Chester A. Perkins, a former state senator. Wm. F. C. Dall is treasurer and general manager. Mr. Dall headed a former company called the North Indiana Brick Co. at Michigan City, Ind., for many years and was at one time mayor of Michigan City. The decision to move to Mishawaka and abandon the Michigan City operation, which used dune sand from the shore of Lake Michigan as its source of supply, was influenced largely by the discovery that sharper sand as found in the Mishawaka pit produces a stronger and denser unit than did the fine, rounded particles of which the dune sand is composed.



The ends of the two 87-ft. hardening cylinders.

The rod-mill which grinds the sand and mixes it with the lime.

All the equipment, with but a few minor exceptions, was designed and furnished by the Jackson & Church Co. of Saginaw, Mich. This concern introduced the Komnick system of manufacturing sand-lime building units into this country in 1901 and has been supplying its Saginaw-system equipment ever since, constantly making improvements as its research revealed new, better and more economical methods of making sand-lime brick and block machinery.



Looking down at the sand and lime bins over the proportioning device with part of the rod-mill visible below.

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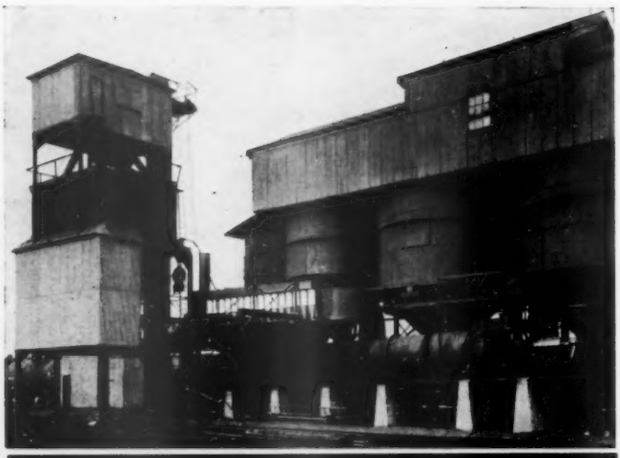

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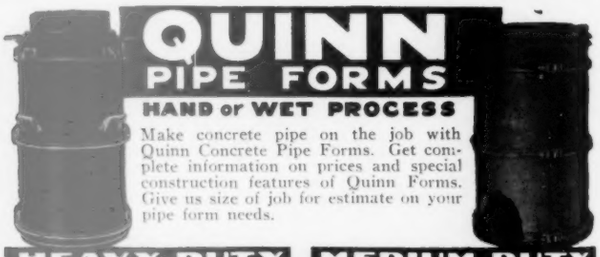

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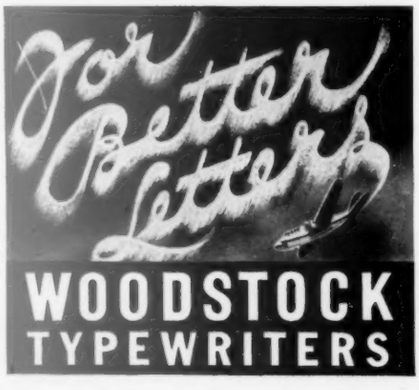

Star Issue of 1938

★ An enlarged "Profitable New Products" Section will be a part of Pit and Quarry's Annual Review and Convention Number in January, 1938. ★ Copies will be distributed at the Cincinnati conventions of the National Sand & Gravel Assn., the National Crushed Stone Assn., and the National Ready-Mixed Concrete Assn. ★ In addition, a special reprint of the PNP Section will be distributed at the concrete and cement-products conventions at Chicago during the first week in February; the reprint will also be mailed to a special list of interested producers who are not regular subscribers. ★ Alert advertisers will be quick to recognize that this Added Circulation and Added Reader Interest at No Added Cost will make the PNP Section for January the advertising buy of the year. ★ For rates and reservations, write or wire:

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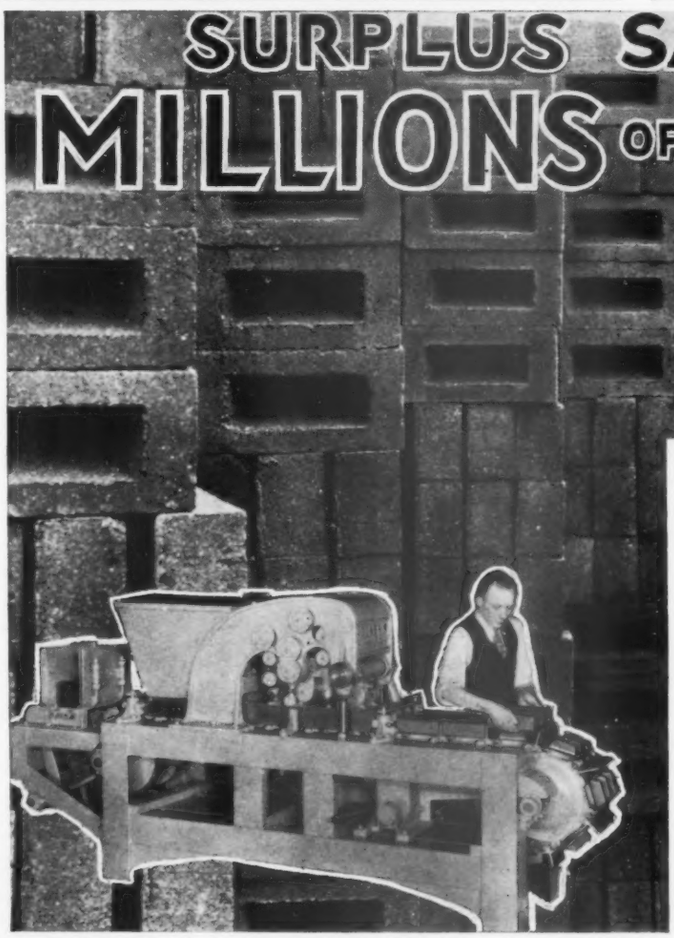

IS THE WAY aggressive producers like Consolidated Rock Products Co., Brooksville, Fla.—Riverside Sand & Gravel Co., Thiensville, Wis.—W. P. Rose, Goldsboro, N. C.—Consolidated Quarries of Georgia—Georgia Mineral Products Co., Tate, Ga., —are converting their surplus sand into profits. Aggregate made into these modern units at labor cost of less than $1.25 per thousand sells up to $12.00 per ton.

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H. H. WAGNER
Secretary-Treasurer
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MEN · OF · THE · INDUSTRY

Shortly after leaving college in 1921, Mr. Wagner took a position as quarry superintendent for the Union Quarries Corp., Hummelstown, Pa., and has been with the concern ever since, having served in various capacities. At present he is secretary-treasurer and purchasing agent. He is one of Pennsylvania's most ardent promoters of the use of crushed stone and has long been active in the affairs of the Pennsylvania Stone Producers' Assn. He served as general manager of that organization in 1936 and was again chosen to guide its affairs during the current year.

Personal Mention

L. H. HUNT who has been a field engineer attached to the Columbus, O. district office of the Portland Cement Assn. has been transferred to the general offices of the association at Chicago. Mr. Hunt has taken over the statistical duties formerly handled by the late A. C. Toner.

EDGAR BAKER of Batesville, Ark., has started the construction of a lime plant on the property of the St. Clair Marble Co., near Guion, Ark. The plant will consist of two kilns with the capacity of 40 tons a day. Waste from the St. Clair quarry will be utilized as raw material.

D. S. COLBURN, vice-president of the Marquette Cement Mfg. Co., Chicago, recently completed an all-concrete house at Highland Park, Ill., north shore suburb of Chicago, which he is occupying as his home. The walls and partitions are of concrete masonry, floors are of reinforced concrete on pre-cast concrete joists and concrete slabs were used on the roof. Exterior walls are finished with cement paint.

LUKE J. BOGGESS and A. J. GRAUL have leased a site adjacent to the plant of the Independent Gravel Co., near Carthage, Mo. and will specialize in the manufacture of concrete blocks and Dunbrik. The new firm will operate as the Nu-Carth Brick & Stone Co. Machinery is now being installed.

C. PARKER HOLT of the Caterpillar Tractor Co., Peoria, Ill., has been placed in charge of the San Leandro, Cal., office as vice-president. He has been succeeded as executive vice-president by A. T. BROWN, formerly vice-president.

HUGO KUROWSKE has become sales manager of the Claude B. Schneible Co., Chicago, manufacturer of dust-collectors.

L. J. MCLAUGHLIN has been appointed as mid-western district manager of the Davey Compressor Co., Inc. He was formerly sales manager of the Hug Truck Co.

A. J. ACKERMAN, who recently resigned as chief construction plant engineer for the Tennessee Valley Authority, has been appointed development engineer for the engineering works division and the contracting division of Dravo Corp. of Pittsburgh, Pa.

FRANK M. ALLEN has established a crushed-stone business at 1254 Bonitz Ave., in the Azusa District of Los Angeles County, Cal.

ALEXANDER W. LIMONT, JR. has been appointed manager of the compressor division of Sullivan Machinery Co. at Michigan City, Ind. He comes to the Sullivan organization from E. I. Dupont de Nemours with whom he has been associated for the past nine years. He was previously connected with the Norwalk Iron Works and the Ingersoll Rand Co.

DUDLEY P. SOUTH, Houston, Tex., president of the Gulf Gypsum Co., was recently appointed to the board of directors of the Texas State Manufacturers' Assn.

W. G. MITCHELL is planning the construction of a plant in Tuskegee, Ala., for the processing of sand and gravel.

RAY HOOTEN, contractor and gravel producer of Greenfield, Ind., has established another sand-and-gravel plant at Eden, Ind. Cement products and ready-mixed concrete will also be produced and marketed.

GEORGE AMES, who for many years was president of the Victorville Lime Rock Co., Los Angeles, Cal., died recently. To succeed him J. S. COLLBRAN has been elected president and WESLEY CADWALLADER has been made secretary and treasurer.

CHARLES MILLER has formed the Miller Concrete Products Mfg. Co. at Chattanooga, Tenn. and has started construction on a $10,000 plant. The new concern will produce building units, fence posts and concrete pipe.

C. W. BOTTS heads the recently-formed Kokomo Ready Mixed Concrete Corp. which has just started operation at Kokomo, Ind.

In PIT and QUARRY

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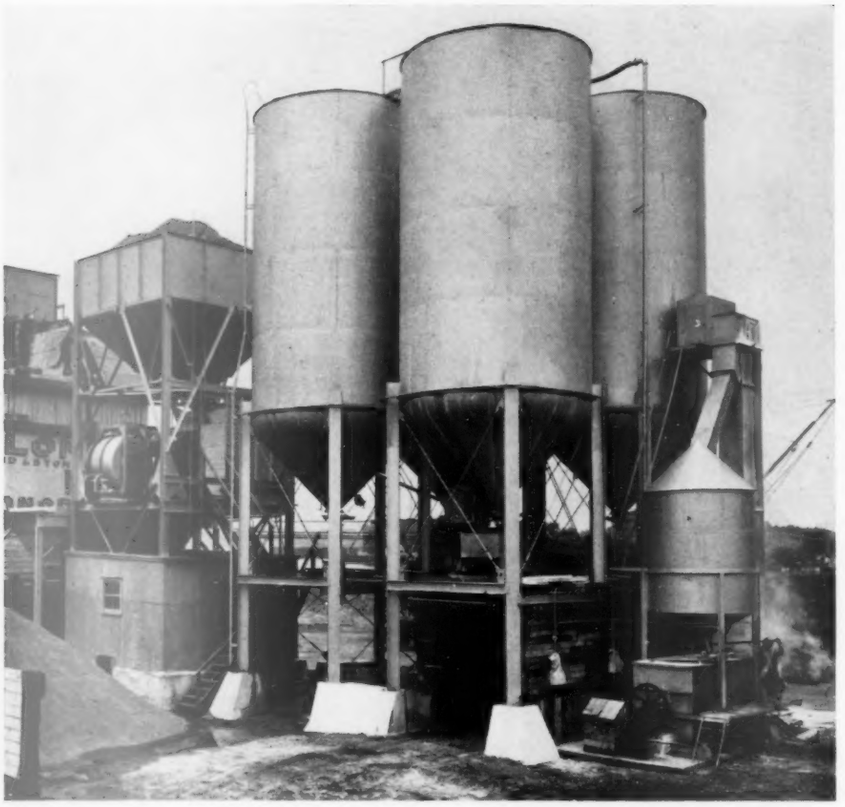

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The Colonial Sand & Stone Company distributes lime putty-sanded brick mortar throughout the New York metropolitan district from the plant illustrated above at Astoria. It has sufficient capacity to produce 600 cu. yds. of mortar daily.

Write our nearest office for further information on the Brooks-Taylor process or equipment. Standard plants are built with two or more ageing tanks, depending upon the capacity required.

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Los Angeles . . . . . 1457 Wm. Fox Bldg.

B-551 Plants at BIRMINGHAM, CHICAGO and GREENVILLE, PA.

James D. Kennedy, former president of the Superior Sand & Gravel Co., died recently at a hospital in Detroit, Mich., following an illness of several months. He was 62 years old and a native of Bay City, Mich.

Charles Yon, 60, Pittsburgh, Pa., vice-president of the Vang Concrete Co. and sales executive of the Iron City Sand & Gravel Corp., died unexpectedly of a heart disease recently.

Albert O. Ohlemacher, 78, secretary and treasurer of the Producers' Core Sand Co., Michigan City, Ind., and a pioneer sand producer and sand-lime-brick manufacturer, died recently.

George Roller of Detroit, Mich., for 22 years production manager of the Michigan Pressed Brick Co. and widely known in the sand-lime-brick industry died recently at his home in Detroit, Mich. He was 54 years old and a native of Sebewaing, Mich.

Frank Sugg, 25, employed in the quarry of the Marblehead Lime Co. at Springfield, Mo., fell sixty feet to his death while at work recently. When his father, William B. Sugg, 78, was informed of his son's death, he also succumbed to shock.

Marion Graupner, 23, was found dead in his office at the Wolf River Sand & Gravel Co., Memphis, Tenn., recently. A pistol was found at his side. He was the son of H. W. Graupner, sales manager at Memphis for the Marquette Cement Mfg. Co.

Maxwell C. Tobias, who had long been connected with the service department of the Universal Atlas Cement Co., Chicago, Ill., died Nov. 12 after a brief illness. Burial took place on Nov. 16 at Rosehill Cemetery.

Lawrence Lang, 51, Cleveland, Ohio, for the past 15 years a salesman for the Universal Atlas Cement Co., died Oct. 28 at his home from injuries received three weeks before when he slipped and fell down a flight of stairs in his home.

I. H. Barbee, manager of the Atlanta plant of the Link-Belt Co. died Nov. 4 in a Philadelphia hospital, which he entered about six weeks ago while on vacation. He had served the Link-Belt Co. at its Chicago, Philadelphia and Atlanta plants for a total of about 25 years.

Foreign Developments

Determination of Degree of Hydration of Cements

On the hypothesis that all of the hydrates occuring in the hydration of cement have an approximately equal density, in the neighborhood of 2.13, the degree of hydration would be incidated by a very simple computation. Supposing the density of the cement examined to be 3.23, and that the density after a certain period of hydration is 2.68, the degree of hydration would be given by the following simple formula:

$$\frac{2.68-2.13}{3.23-2.13} = 0.50, \text{ or } 50 \text{ per cent.}$$

It would thus be sufficient to know the specific weight of the cement unhydrated and to determine its specific weight at the desired moment by the aid of a simple pycnometer to obtain the degree of hydration for that moment of the reaction. The validity of these assumptions is investigated in the experiments reported, both in computations based on the specific gravity of the hydrates determined to be formed in the hydration of the cements investigated, and in comparative check tests of the actual progress of hydration. The experimental results agree remarkably well with those computed according to the formula, the greatest deviation being in cements in which *gamma* dicalcium sulphate is formed. The results are also correlated to the results of actual strength tests.—Antoni Eiger in *Revue des Materiaux de Construction et de Travaux Publics*, No. 335, pp. 161-165, and No. 336, pp. 187-192, August and September, 1937.

Liter-Weight Relation to Quality of Cement

Because of the practical importance of the degree of burning for the development of the properties of cement the introduction of the "liter-weight" for the control of the degree of burning would be—generally speaking—a progressive step. Nevertheless, a study of a number of clinkers shows that the "liter-weight" is not a sufficient indication, for variations in the chemical composition are not indicated by the liter-weight. For indication of the degree of burning of the clinker the liter-weight can be applied with good results; more nearly perfect results, however, are obtained with the true volume-weight (specific weight), as in this more elaborate determination the possible variations in the volume of voids is comprehended.—G. Mussgnug in *Zement* 26: 671-676, Oct. 14, 1937.

Hardening of Sorel Cement is Explained

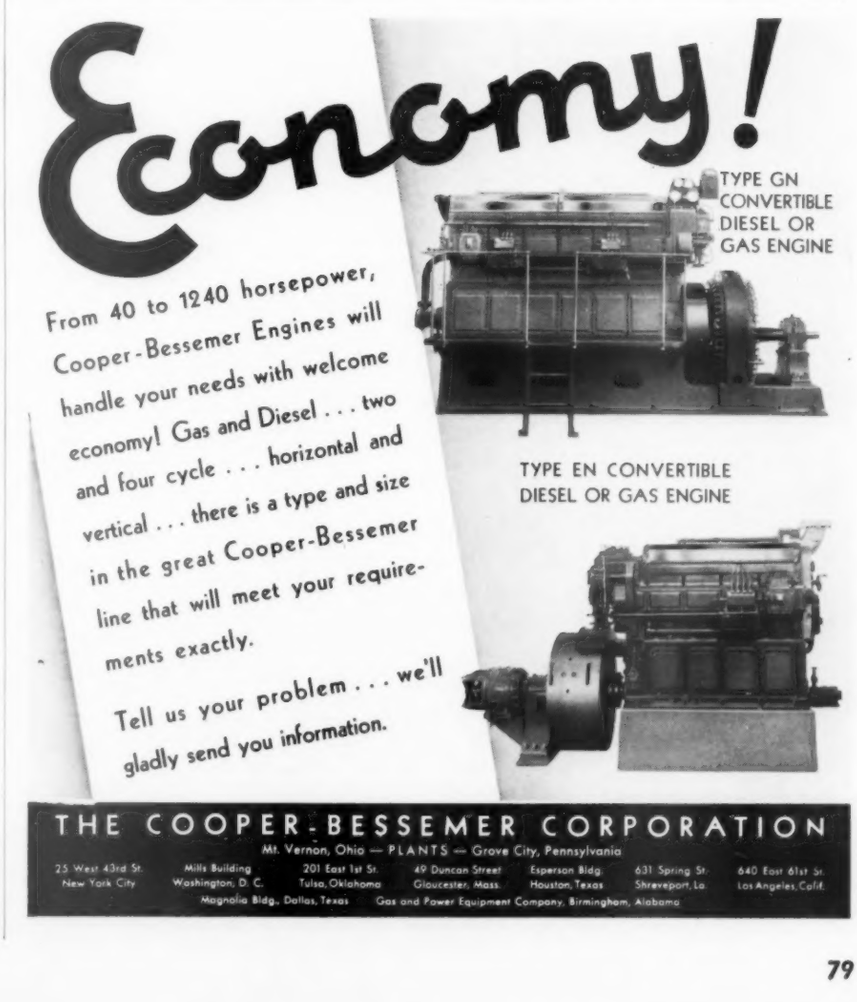
A study of recent researches on the hardening of Sorel cement leads to the conclusion that this hardening is a slowly proceeding slaking process of appropriately burned magnesite, together with the effect of an amorphous mixture of $MgCl_2.3MgO.xH_2O$ and $Mg(OH)_2$ which penetrates the hardening mass. This mixture facilitates the hardening and results in a compound which microscopically appears uniformly amorphous, but seen with the X-ray is a crystalline hardening product of the crystal form of the $MgO\text{-}MgCl_2$ which is formed.—V. Rodt in *Zement* 26:597-602, Sept. 9, 1937.

Study of Composition of Portland Cement

In the investigation reported here, five cement clinkers of the Portland cement series, of quite different chemical composition, were produced in the kiln, and the ground clinker passing the 10,000 mesh sieve was separated into many fractions by means of a centrifuge, using suspension fluids of different specific gravity, then studied by chemical analysis, the microscope and the X-ray.

Chemical analysis showed that with increasing specific gravity of the clinker fraction the content in alumina, iron oxide and magnesia increases, while the content in silica and lime decreases. The clinker components were computed from the data of the analyses according to Bogue's method, and it appeared that as the specific gravity of the clinker fraction increases the content in $4CaO.Al_2O_3.Fe_2O_3$ increases and the proportion of $3CaO.SiO_2$ decreases. $2CaO.SiO_2$ increases with rising specific gravity in Kühl cement, high-alumina Portland cement and high-test (*hochwertig*) Portland cement, while the opposite is the case in low-test cement and Brownmillerite cement.

The relation between particle size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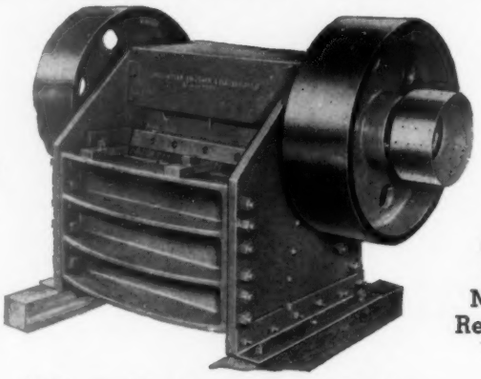

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Lang's Lay
•
Hemp Center
•
Wire Rope Center
•
Metallic Core
•
Seale-Filler Wire Warrington

and specific gravity was also studied and it was found that the influence of the particle size on the specific gravity is astonishingly great when the clinker has a high specific gravity.

The X-ray investigation showed that the clinker fraction of lowest specific gravity corresponded well with the tricalcium aluminate diagram, proving neatly the existence of $3CaO.SiO_2$ in all varieties of clinker. The Roentgenogram of the heaviest clinker fractions presented a quite different picture from that of the lightest fractions. The diagrams of high-alumina and high-test Portland cement showed almost complete correspondence with dicalcium silicate, while in the Roentgenogram of low-heat cement and Brownmillerite cement the lines of the two lime silicates, $3CaO.SiO_2$ and $2CaO.SiO_2$ were recognized simultaneously, which establishes fairly surely the existence of *beta* dicalcium silicate.

In the Roentgenogram of Kühl cement, low heat cement and Brownmillerite cement many lines of tetracalcium alumino-ferrite are plainly recognizable, which fairly certainly establishes that tetracalcium alumino-ferrite exists in many cements of the Portland cement range. It is noteworthy, however, that in Kühl cement dicalcium silicate was not found either in the lightest or in the heaviest fraction and only tricalcium silicate and tetracalcium alumino-ferrite was recognized.

Tricalcium aluminate showed its two lines of strongest intensity in the lightest fractions of high-alumina cement and of high-test Portland cement, but its existence was still not certainly explained by this investigation.—Dr. K. Koyanagi, S. Katoh and T. Sudoh in *Zement* 26:531-539, Aug. 26, 1937.

Observations on Gypsum for Fire Protection

Some studies by M. Chassevent on the use of gypsum in fire protection, published in *L'Entreprise* of Zurich, Switzerland, are reviewed in *Revue des Materiaux de Construction et de Travaux Publics* for August, 1937 (No. 335, page 176). On the basis of comparative tests on slabs of differing thickness, a thickness of 20 to 30 mm. is recommended as a sufficiently efficient protection for most practical conditions. A wire netting embedded in the gypsum and protected from rust by a coating of cement, is recommended.

Traffic News Digest

Legislation

Government Reorganization.—At the convention of the Assn of Practitioners before the Interstate Commerce Commission held in St. Louis, Oct. 15, the following resolution was adopted:

"Resolved, that the Assn. of Practitioners before the Interstate Commerce Commission oppose any legislative proposals to authorize the executive branch of the Federal government to reorganize, regroup, transfer, change or impair any of the functions or jurisdiction of the Interstate Commerce Commission now being exercised under the existing statutes, or to control the employment of attorneys, examiners, statisticians and other technicians by the Commission."

Long- and Short-Haul Bill.—There was a great deal of agitation at the annual meeting of the National Industrial League held in Chicago Nov. 18 toward changing the attitude of the league on the Pettengill bill to repeal the long- and short-haul clause of the 4th section. The league had previously gone on record as favoring this legislation and after a great deal of discussion reaffirmed its position by a vote of 107 to 52.

Train Limit Bill.—As previously mentioned, a bill limiting the length of freight trains to 70 cars was passed by the Senate without a hearing and is now pending before the house committee on interstate and foreign commerce. The National Assn. of Advisory Boards at a meeting held in Chicago on Nov. 3 adopted a resolution instructing its president and four additional representatives to be appointed by him to appear at hearings before the house committee in opposition to this bill. The National Assn. of Advisory Boards is made up of representatives of the various national advisory boards which are composed of industrial-traffic men from all parts of the United States. This legislation was introduced at the request of organized railroad labor allegedly as a safety measure but in the opinion of many shippers it is simply a "make-work" bill designed to increase the number of employees necessary to operate the trains, as many contend that there is more safety in longer, slower moving freight trains than the faster short trains. It is generally agreed that the enactment of this legislation would enormously increase transportation costs.

Recent I. C. C. Decisions

General Commodity Increase.—By this time readers of PIT AND QUARRY are generally familiar with the increases in rates which were allowed by the commission in reopened Ex Parte No. 115. Many of these increases went into effect on Nov. 15 with others to follow shortly thereafter. It is estimated that these increases will provide an additional revenue of $47,500,000 on the basis of 1936 traffic. In the two previous reports the Commission had found some fault with the railroads for having got themselves into a position where more revenue was needed. The tone of this decision is very friendly to the carriers. There was only one dissenting opinion; that of Commissioner Aitchison. In his dissenting opinion, he did not approve the increases on bituminous coal, cement, lime, mortar, plaster and related products, petroleum and its products and a few other commodities.

Examiner's Report

Crushed Stone.—On April 21, 1937 a complaint was filed under sections 1 and 3 alleging unreasonable and prejudicial rates on crushed stone from Bowmansville, N. Y. to destinations in Ohio, New York and Pennsylvania for distances up to 200 miles from Bowmansville, west of a line drawn through Rochester, N. Y., and Cumberland, Md. It was alleged undue preference was shown crushed-stone producers, at Akron, Cheektowaga, N. LeRoy and Stafford, N. Y. and Annandale, East Brady, Hillsville, Shaw Jct. and Walford, Pa. In his proposed report, Examiner Burton Fuller recommends that the present rates be found unreasonable and unduly prejudicial for joint line but not for single line hauls and that the Commission find the joint line rates unreasonable and unduly prejudicial to the extent they exceeded or might exceed by more than 10c. per net ton the rates from Buffalo, N. Y., in connection with the same delivering carriers to the same destinations, subject to the Buffalo rates as maxima where the delivering carrier served neither Buffalo nor Bowmansville or where Bowmansville had a lesser distance than Buffalo. This case was heard coöperatively with the New York Public Service Commission. I. C. C. Docket No. 27,714 Buffalo Crushed Stone Co. *v.* Arcade & Attica. *et al.*

New Complaints Filed

Dry Building Mortar.—The rates on dry building mortar from Linnville, Va. to destinations in southern classification territory have been attacked under sections 1 and 3 by the reason of the failure and refusal of carriers to publish commodity rates. The complaint filed by William Paxton, president of the complainant asks for commodity rates on dry building mortar the same as currently applied on building lime from Linnville. I. C. C. Docket No. 27,880 Rockingham Chemical Lime Corp., Linnville, Va., *v.* Southern and *N&W*.

General Rate Increase.—On Nov. 5, Class I railroads filed with the Commission a petition asking for an increase of 15 per cent. with certain exceptions in freight rates, and increases in passenger coach fares in the east from 2c. to 2½c. a mile. The exception to the 15c. increase on freight rates was to be limited by the following maxima: bituminous coal and coke, 15c. a ton; anthracite coal, 25c. a ton; fruits and vegetables, 15c. per cwt; lumber, 6c. per cwt; and sugar 6c. per cwt. The petition asks that special permission be given to make the increase effective on short notice and suggested that the Commission invite the coöperation of state commissions toward making an increase effective also on intra-state traffic. The reason given for the increases in the petition was that present rates did not yield sufficient revenue over and above operating costs to insure their ability to continue in the public interest the adequate and efficient service contemplated in section 15a of the interstate commerce act. They further sight the fact that there has been subsequent increases in the prices of ma-

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"Very satisfactory for kiln sand"

"We use the Leahy screen at our plant for screening kiln sand. It has been in use for approximately two years, and has been very satisfactory."—(Name on request)

"Working O.K. after five years"

"Our Leahy double decker, 4' x 7', is working OK after five years of service. We also recently purchased a Concenco Washing Table."—The Home Sand and Coal Co.

"Well pleased with its performance"

"We use the Leahy screen for screening and grading cinders used in the manufacture of "Straub" Cinder Units, and are well pleased with its performance."—Pottsville Building Block Co.

WHY NOT SPECIFY LEAHY SCREENS FOR YOUR JOB AND ENJOY THE ADVANTAGES OF "FINE SCREENING".

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THE ORIGINAL
DEISTER CONCENTRATOR COMPANY
INCORPORATED 1906

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terials and supplies and in railway labor unit cost, also in taxes and for unemployment insurance under the Social Security Act. The railroads estimate that the increased cost of materials, supplies, labor and taxes for the 12 months beginning Oct. 1, 1937 with the tax rates going into effect Jan. 1, 1938 will reduce the operating income for that period approximately $245,000,000. This in spite of the fact that the recently granted increases in certain commodity rates in Ex Parte 115 will be in effect.

J. J. Pelley, president of the Assn. of American Railroads, issued a statement following the filing of the petition in which he said that should the increases be granted the public would still pay less for freight and passenger transportation than before the depression. The average charge for hauling freight would be slightly more than 1c. for hauling a ton one mile. In comparing present costs with 1932 he says there has been an increase in the prices of materials and supplies of 40 per cent., an increase in wages of 18 per cent. and in taxes 25 per cent., while during the same period the average freight rates have decreased 10 per cent. and the average passenger fares have decreased 15 per cent.

That there will be vigorous opposition to the proposed increases by some industries is assured by action already taken. The National Bituminous Coal Commission and Consumers Council not only expect to fight the increase in this case but have announced that they will ask the Commission to reconsider the increases granted in Ex Parte No. 115. This is a case where one department of the government is finding fault with another department. The Coal Commission in its statement points out that the average cost of locomotive coal has been reduced from $2.01 per ton in 1929 to $1.89 per ton in 1936 and that bituminous coal is the railroads' most profitable commodity and their best customer through good times and bad and that the revenue producing bituminous-coal tonnage originated by the class I railroads for a long period of years has constituted from 28 to 35 per cent. of all revenue carload traffic originated.

American Trucking Assn., Inc., in filing a petition for intervention says that the trucking industry will present evidence to show the need for additional revenue to maintain sound economic conditions in the trucking industry and to maintain adequate motor service; the need for proper correlation of rail and motor rates for the preservation of the inherent advantages of the respective transportation agencies and to present at one public hearing a representative composite economical picture of the revenue needs of the motor carrier industry which can not be presented by individual carriers; and to show the relation of motor carrier economics to the proposed railway increases. The petition has been accepted. In the acceptance Commissioner Aitchison said it was understood that the petition did not look to the entry of findings or orders as to the members of the association.

The water carriers operating to and from ports on the Atlantic and Gulf coasts and Chesapeake Bay are also seeking authority to increase their rates, fares and charges in line with the increase sought in this case.

At the annual meeting of the National Industrial Traffic League held in Chicago Nov. 18 a resolution was passed stating that the league would take no position as to whether the increases should be granted or not but that the Commission be requested to allow 30 days from the conclusion of the initial hearing for the preparation of the shippers' case. Opposition to the increase has been voiced by the Structural Clay Products Institute represent-

ing brick and structural-tile manufactures who claim that the proposed increase would increase the cost of building materials which would subsequently further retard home building.

Traffic News

The Southern Governors' Rate Case.—Acting opposition to the petition filed by the governors of the southern states asking for a lower level of rates from the south into official territory on commodities produced in the south is developing in the territories that would be adversely effected by the granting of this petition. Attorney General Bennett of the state of New York has filed a petition for intervention and Parker McCollester has been retained as attorney for the state. He will also represent the state of New York chamber of commerce. Governer Lehman is trying to interest governors of other northern states. Governor Hoffman of New Jersey asked the legislature to appropriate $85,000 to be used in fighting this case but action was deferred until Dec. 20. Governor Graves of Alabama had denied the allegation that there was a deal between southern and northern members of Congress whereby the southern members of Congress supported the Black-Connery wages and hours bill in exchange for support in the north for the proposal to lower freight rates from the south. I. C. C. Docket No. 27,746 State of Alabama *v.* N.Y.C. *et al.*

I. C. C. Practitioners.—The Interstate Commerce Commission years ago adopted rules for practice before that body in which it permits both attorneys and non-attorneys to practice under certain conditions. Heretofore the percentage of traffic specialists who were not attorneys but who were admitted to practice has been very high. It is alleged that recently a large number of attorneys who do not practice before the Commission have petitioned for admission to the bar of the Commission in order to try to influence the rejection for admission of all those who are not attorneys. This has brought out the opposition of non-attorneys who are known as class B practitioners. In a recent issue of the *Traffic World* appears a letter from W. S. Barton, traffic manager of the Ash Grove Lime & Portland Cement Co. of Kansas City, Mo., who calls attention to the fact that a great many of the class B practitioners are unqualifiedly better equipped to handle traffic needs for their companies than are the so called bona fide attorney members. He gives the following example:

"Not long ago an intrastate case was filed before the Missouri Public Service Commission, in which state only regular attorneys can appear before the commission. It was necessary, therefore, in order to present the case, to have the expert traffic manager retain an attorney at law, who had to be schooled throughout the entire proceeding. The traffic manager himself actually handled the case by proxy through the attorney, who was entirely ignorant of the laws governing the transportation act of the state itself."

In other states the laws have recently been changed making it necessary to employ an attorney for making out even the commonest of legal forms. This comes about no doubt from the fact that state legislatures are generally dominated by attorneys, but it looks as though there will be some opposition in trying to take over the handling of traffic cases from men of such wide experience as Mr. Barton and other traffic experts in the non-metallic industry.

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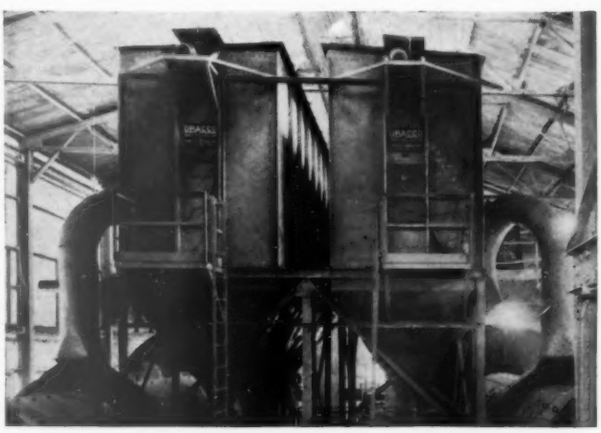
Three DRACCO MULTI-BAG FILTERS were installed in the raw mill—each to handle 10,000 C.F.M. to start and a maximum of 15,000 C.F.M. Two DRACCO MULTI-BAG FILTERS were put on the finish mills,—these mills were designed for much finer grinding than has been customary. The mills are air-swept in order to get the fines away faster and also to reduce temperature during grinding. Cement would leave the old style mills at about 300° to 350° F.—and with new mills this is reduced to between 200° to 250° F. DRACCO MULTI-BAG FILTERS collect cement that leaves the mills equal to 7½% of grinding capacity. DRACCO Engineers with over 20 years experience have solved many Dust Control problems—why not yours?



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DRACCO MULTI-BAG FILTERS in ALLENTOWN PORTLAND CEMENT COMPANY PLANT

DRACCO DUST COLLECTORS are maintained ON THE CLEAN AIR SIDE

WORKED ON FILTER NOT MAINTAINED ON CLEAN AIR SIDE

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PNEUMATIC CONVEYORS • DUST COLLECTORS

New Machinery and Supplies

• Detonating Fuse

A new flexible detonating fuse manufactured under the registered name of "Primacord," has been announced by the Ensign-Bickford Co., Simsbury, Conn. Explosives experts who have seen and tested this new material are enthusiastic and regard it as one of the greatest developments in explosives in recent years.

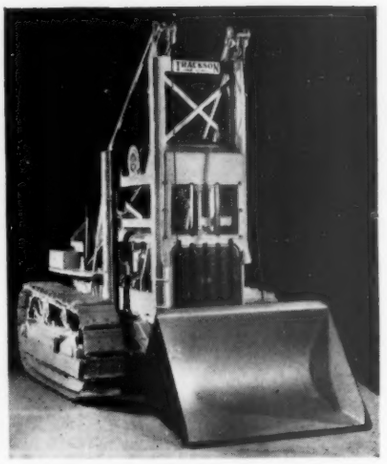
Primacord-Bickford detonating fuse has a faster detonating wave than has Cordeau-Bickford. Its fabric covering affords greater flexibility with minimum weight, suitable tensile strength, and excellent waterproof qualities. Thus, it opens up a vast new field for the use of detonating fuse. It is insensitive. It can be handled quickly and easily. Main lines can be laid much closer together than can main lines of Cordeau as there is no metal covering to cause injury to the adjacent lines through propellant action.

The product has been thoroughly tested, both on the Ensign-Bickford proving ground and in the field. Production is limited at the present time and no general distribution is being undertaken. The company is, however, expanding production facilities, and expects to be able to take care of a normal demand before many months have passed.

• Tractor Shovel

The Trackson High Shovel is now available on Caterpillar tractors R4 and D4. This heavy-duty digger and loader will excavate in clay, gumbo or rocky soil; do stripping, leveling and subgrading; charge conveyors, crushers and concrete mixers; remove snow; and transport or load all kinds of bulk materials.

The High Shovel is regularly equipped with a ¾-cu. yd. bucket and will dig, move and load up to 50 cu. yd. per hour. Advantages claimed for this machine are: a fast mechanical hoist which is not affected by weather temperature; independent front end drive; free dumping of the bucket at any point of the lift; automatic release when bucket reaches maximum height; full visibility for the driver; and many other features. The Caterpillar tractors to which this shovel is adapted are specially equipped with wide-gauge, extra-length (5-roller type) rigid-track frames, front power take-off and blower-type fan. Further details may be secured from any Caterpillar dealer or from the Trackson Co., Milwaukee, Wis.



High shovel mounted on tractor.

• Excavator

The 33-B, a 1¼-cu. yd. excavator convertible for shovel, drag-line, clam-shell, crane, or drag-shovel service has recently been announced by the Bucyrus-Erie Co., South Milwaukee, Wis. Modern alloy steels and welded construction have been used to produce a machine that combines smooth working operation, high speed, high mobility, and ample strength to give steady dependable service in the heavy digging expected of a machine of this size. It is available with gasoline, Diesel or electric power.

The 33-B has many unusual features which warrant special attention. A few of them are:

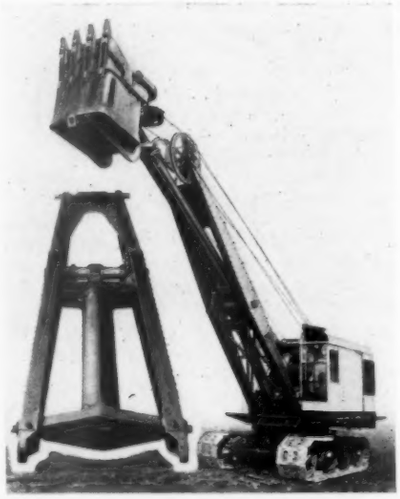
1. Unusually long crawler frames to reduce "nosing in" when digging.
2. Crawler side frames of unit steel castings.
3. Welded box-girder boom, light-weight for speed, strong for endurance.
4. Powerful, modern hoist and chain crowd.
5. Dipper having manganese-steel casting, "V" type front, with sockets for Bucyrus-Erie patented inserted teeth and having curved plate door.
6. All high-speed shafts operate on ball or roller bearings.
7. Snappier swing action and high-speed output as a result of elimination of dead-weight.
8. Big wide-faced clutches that take hold smoothly and firmly and hold adjustments accurately.
9. Simple lubrication. Vital points cared for by complete enclosures containing oil.

• Shovel Boom

Among the new improvements and developments in excavating equipment is the new shovel boom recently developed by the Thew Shovel Co. for use on its 1½-cu. yd. Lorain 77 and 1¼-cu. yd. Lorain 75-D.

Since severe torsional stresses occur in a shovel boom, this boom is based on an actual analysis of these torsional stresses and has been designed with an accurate provision for them in the form of a separate torsional member.

The boom is virtually two booms in one—one a structural member absorbs all bending and compression stresses. The other, a torsional member, absorbs and resists all boom twisting stresses. Each member is connected independently to the shipper shaft and boom hinges in such a manner that no torsional stresses can pass through the structural member and no bending stresses can be transmitted to or through the torsion member.



New excavator boom showing separate torsional member.

The structural side members of the boom are fabricated of plates and alloy steel angles riveted and electric welded together into a plate girder construction. These members act as a beam and absorb all boom bending and compression stresses. These members are "fish belly" in shape with the deepest and strongest

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Any size or style screen, in thickness of steel wanted with any size perforation desired.
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section being at the center at the shipper shaft or point of maximum stress.

All boom twists and torsional stresses are absorbed by a separate torsional member which extends from the shipper shaft to the boom hinges. This member is a huge seamless tube about 11 in. in diameter, the ideal section for the greatest torsional resistance at minimum weight. Since torsional stresses are developed in the boom at the shipper shaft point, the torsional member is fastened to the shipper shaft by means of a cast steel U-shaped yoke. The yoke absorbs the shipper-shaft torsional stresses and transmits them into the tubular torsion member, which transmits them to the base of the boom where they are, in turn, transmitted into the boom foot hinges by means of a cast-steel crosshead. The torsion member is connected to the yoke and crosshead by electric welding.

• Excavator

The new Lima Type 650 is a convertible shovel, crane or dragline. When used as a shovel it is equipped with a 1½ cu. yd. dipper, 21 ft. boom and 17 ft. dipper handle. The shovel boom is the box-type design, electrically welded throughout. The dipper handle is of the same modern construction. The Type 650 is available with either a gasoline, Diesel, oil or electric power unit. Only three levers and two foot pedals are necessary to control the three major operations, hoist, swing and crowd. Each major operation is independent of the other, which makes it possible to hoist, travel, swing and raise or lower the boom simultaneously. The drum laggings are split

Type 650 1½-cu. yd. excavator.

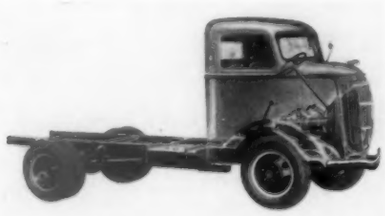
and are easily changed to fit any line speed. Helical cut gears are used throughout to assure smooth, quiet operation. To further the efficiency of the Type 650, roller bearings are used at every vital bearing point.

The crawler truck is composed of a one-piece base casting with four thru axles on the ends of which revolve eight open type self-cleaning rollers. It is of the end drive principal with drive chain located back under the crawler treads. Steering is accomplished with the upper frame at any position, which is an advantage when propelling in close quarters. The crawlers are so designed that they can be extended in length to increase the ground bearing area. The change from short crawlers to long crawlers can be made without dismantling the machine. The cab has an in-built winter front of shatter proof glass. More than one-half of the area of the cab can be opened to give ample ventilation in hot weather.

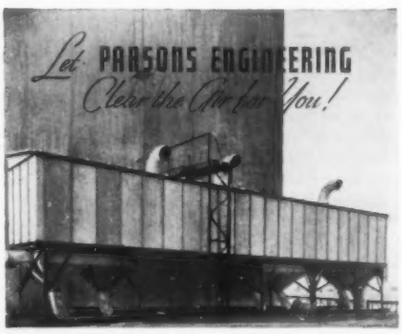
• Motor Truck

An entirely new line of cab-over-engine models in the moderate priced field is announced by Reo Motor Car Co., Lansing, Mich. In addition to the usual cab-forward advantages of ideal weight distribution, greater load carrying space, shorter overall length and ease of handling in traffic, the new Reo cab-over-engine models feature appearance, accessibility, driver comfort and safety.

Weight distribution on Reo's new cab-over-engine models is approximately one-third front and two-thirds rear, while on conventional trucks the front axle carries only 20 to 25 per cent. of the total vehicle weight. Thus with a gross weight of 12,000 lb. for example, the front axle of the Reo cab-over-engine truck carries 4,000 lb. while the corresponding front end weight of a conventional truck with the same load would be only 2,400 to 3,000 lb. To provide an ample margin of safety for this new weight distribution Reo uses heavier front



Cab-over-engine truck chassis.



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is a bucket that will keep the closing line *free*, avoid jammed sheaves and extravagant rope wear.

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You can reeve it for extra-hard digging or for more speed when less closing power is needed.

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Complete Plants Designed and Equipped.
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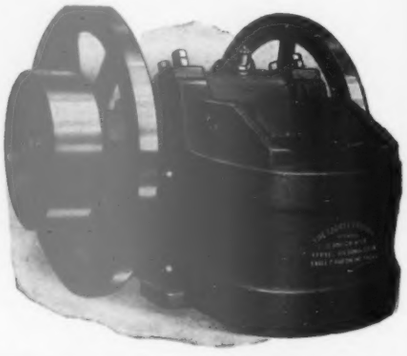


EARLE C. BACON, Inc.
17 John Street New York, N. Y.

axles on its new cab-over-engine models than on corresponding conventional types.

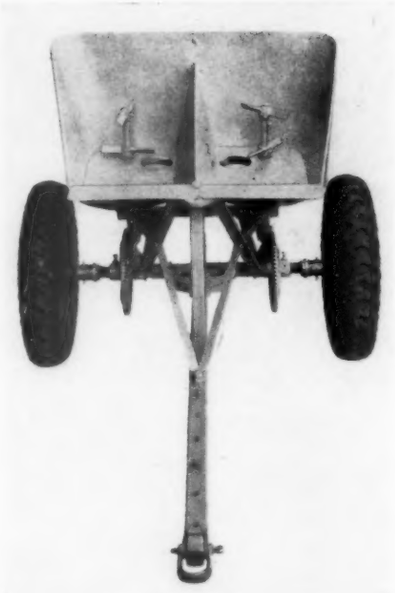
Because these new units are engineered from the ground up for cab-forward service, Reo engineers claim they have greater mechanical accessibility, increased dependability, lower maintenance costs and more uninterrupted hours of profitable operation.

Reo's new cab-over-engine trucks are presented in two capacity ranges, 12,000 to 15,000 lb. gross rating, and are equipped with the 228 and 268-cu. in. Reo Gold Crown engines. Four wheelbases are offered in either series, 105 in. for close-coupled tractors, 125 in. for tractor and dump service, 147 in. for 12-ft. bodies and 166 in. for 15-ft. bodies.

• Air-Line Anti-Freeze

An additional and improved system of air-line and air-tool freeze preventative known as "Frosto" is being marketed by the Sullivan Machinery Co., Michigan City, Ind., to supplement Tanner-Gas which has proved so successful on construction, industrial and mining operations. Frosto has been developed particularly for industrial applications and wherever electric current is available for its operation. In operation, the Frosto is vaporized in a "vaporizer" and is fed into the compressed-air line near the compressor as fast as necessary to prevent freezing of water vapor in the compressed-air lines and air tools.

This system is very effective and economical —current consumption is small and thermostatically-controlled and only about a quart of Frosto is required to treat 100,000 cu. ft. of free air under the worst conditions of temperature and humidity.



Producers of agricultural limestone are often asked to recommend an efficient and economical spreader for the material. The Peoria Steel & Wire Co., Peoria, Ill., has recently brought out the new model shown above which is being used by many farmers who speak highly of its dependablity in service and the uniformity with which it distributes the stone. Drawn by a team or tractor, the machine has a spreading capacity of from 15 to 24 ft.

• Conveyor Belting

The B. F. Goodrich Co., Akron, O., has announced a radically new conveyor-belting featuring cord construction which is said to give considerably longer wear than the best belts of the fabric-carcass type.

Whereas conventional conveyor-belt design dictates a carcass built up out of plies of woven fabric, Goodrich engineers have developed a construction which substitutes plies of weftless cords such as are used in the modern heavy-duty truck tire. The result is a belt carcass in which every tension member is completely surrounded and insulated with rubber to increase its ability to absorb and withstand shock.

Since these cords have no transverse or filler threads obstructing their freedom of movement, they are free to distort themselves. Naturally, this supplements the cushioning qualities of the cover to a degree where the belt has unusual resistance to impact, cutting and gouging.

The belting possesses extreme transverse and longitudinal flexibility. It can be used without difficulty on installations requiring heavy belts which previously gave trouble due to the

Two years ago the Ottawa Silica Co. of Ottawa, Ill., took under consideration the possibility of conveying silica sand in rubber-lined pipe. At that time a test length of 8-in. steel pipe, lined with a 1/4-in. layer of Goodrich abrasion-resisting rubber, was installed on the discharge side of the Pulsometer pump located at the concentration chamber. The original length of rubber-lined pipe is still in service and shows no signs of serious wear. As a result the company last year installed an additional 900 ft. of 8-in. pipe lined with 1/4-in. Goodrich rubber.

belt being too stiff transversely and not troughing easily. Great longitudinal flexibility allows the belt to flex easily over all pulleys without setting up stresses that might cause ply separation.

Goodrich cord belting is available in any length, width and number of plies. In installing this belting, it is essential that it be spliced endless on the conveyor by means of portable electric-vulcanizing equipment. This is necessary because to date no fastener has been devised that will do a satisfactory job on a belt of this design over a long period of time. However, the Goodrich company advises that they are adequately equipped to render this splicing service, having portable electric-vulcanizing equipment for all sizes of belts and trained men who are continually in the field doing work of this kind on all types of conveyor and transmission belting.

• Cement-Grinding Aid

In addition to the advantages of TDA, dispersing and catalytic agent, described on page 96 in the October issue of PIT AND QUARRY, the Dewey & Almy Chemical Co., Cambridge, Mass., points out that the first interest of TDA to the Portland-cement manufacturer lies in its property of acting as a grinding aid. Its use allows greater output of a given grinding mill and at the same time imparts as a plus value, the dispersing and catalytic effect on the finished cement.

More than 25 cement plants are already using it because of this property, according to the maker.

• Portable Pyrometer

The instrument shown in the accompanying illustration is a new portable recording pyrometer—one of a new line of Pyromasters manufactured by the Bristol Co., Waterbury, Conn. The simple operating principle of these instruments and their compactness of construction, give them special features that are especially useful for portable service. In summary these features are as follows:

Portable recording pyrometer.

The instrument is unusually rugged—not affected by vibration—does not require careful leveling while in use. There are no continuously moving parts or trains of gears to become engaged and released to position the pen on the chart—no mechanical motion of any kind, except when a change in temperature occurs at the thermocouple.

When an unbalanced condition in the potentiometer circuit occurs, a series of relay-actuated switches operate a motor to position the slide wire contact to which the pen arm is mechanically connected.

The galvanometer is equipped with a highly damped coil—the galvanometer arm is free to deflect at any time, not being periodically engaged by a clamping device.

The instrument is constructed so that it is composed of five separate replaceable units—there is no mechanical connection between the galvanometer and any of these units, the connection being electrical, only.

• Mild Steel Electrode

A new mild steel arc-welding electrode, designed particularly for use with small alternating-current transformer-type arc welders which is said to simplify welding with this type of equipment and provide weld metal of high quality, is announced by the Lincoln Electric Co., Cleveland, O.

The new electrode, designated "Transweld," is the result of extensive research on the part of Lincoln engineers to develop a rod which would meet the special requirements of small a.-c. transformer welders.

"Transweld" has a heavy extruded coating and, unlike ordinary electrodes used with small alternating-current welders, has a stable

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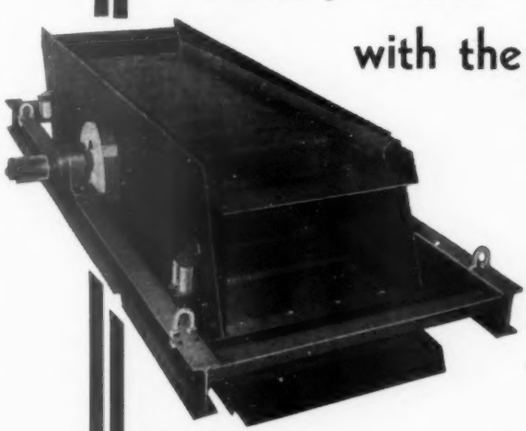
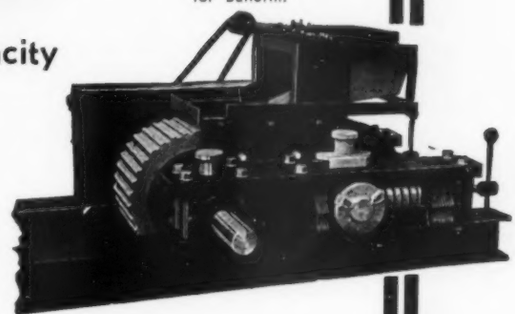


Vibrating Screen, the outstanding development of New Holland that is bringing lower costs to producers of sand and aggregates. Start 1938 with the advantages which this modern equipment offers. Six sizes; one to three decks. Write for Bulletin.

Double Capacity

has been achieved in the New Holland Roll Crusher by the patented Pulsating Feeder. Be sure to get details of this high production unit before you decide on your next crusher.



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For the sake of economy and efficiency . . for maximum freedom from costly and annoying maintenance problems in processing and handling . . call on Jeffrey engineers. They rely on experience.

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DOUBLE PROTECTION FOR YOUR PIPE LINES WITH NAYLOR Lockseam Spiralweld PIPE

Here's all the ECONOMY of light-weight pipe PLUS double protection for your pipe lines.

Only Naylor Pipe gives you this protection—made possible by the exclusive Naylor Lockseam Spiralweld Structure.

FIRST—the Lockseam carries the load. The Spiralweld acts merely to seal the pipe leak-tight, whereas all other welded light weight pipe depends entirely on the weld to hold the structure together.

SECOND—the Lockseam Spiralweld acts as a cushion protecting your lines against expansion, contraction, vibration and shock loads—a feature offered by no other pipe.

Use Naylor Pipe for your high and low pressure water lines. Sizes from 4" to 30" in diameter. All types of connections and fittings available.

Write for New Catalog

NAYLOR PIPE COMPANY
1260 East 92nd Street — Chicago, Ill.

arc, easy to strike and hold. Because of its stable arc the electrode allows making welds in smooth well-shaped beads. Another advantage is in regard to slag removal. Slag is easily removed from "Transweld" deposits.

• Wagon Drill

The Ingersoll-Rand Co. has announced its new FM-2 wagon drill.

A distinctive feature of this new light-weight drill, according to the manufacturer, is a ratchet by means of which one man can quickly raise or lower the drill guide on the uprights. This drill has the same automatic, positive feed at any angle, which proved so successful on the previous model. This air-motor controlled-pressure feed provides an infinite range of feed pressures from 1 to 1000 lb. A worm gear, which transmits power from the air motor to the feed chain,

Light-weight wagon drill.

is self-locking, eliminating all thrust and shock to the motor, and preventing the drill from dropping or jumping forward.

The FM-2 wagon mounting uses the same fast and powerful drills as the larger wagon drills and will accommodate a 6-ft. steel change. Twenty-foot steels are easily handled. The FM-2 is built for continuous, heavy-duty operation, yet it is light and has the versatility of a Jackhamer.

TRADE NOTES

The Hanson Excavator Works division of the Hanson Clutch & Machinery Co., Tiffin, O., announces the appointment of the following firms as Hanson dealers: The Equipment Co., 30 Prentiss St., Boston, Mass.; Dale & Rankin, Inc., 113 Frelinghuysen Ave., Newark, N. J.; Construction Equipment Co., Post Office Box 671, Hartford, Conn.; J. Shuman Hower, 85 N. Genesee St., Utica, N. Y.; R. C. Stanhope, Inc., 101 W. 31st St., New York, N. Y.

Morris Machine Works of Baldwinsville, N. Y., announces the appointment of the Lang Co. as representative in Salt Lake City. The Lang Company will handle sales of Morris centrifugal pumps and hydraulic dredges in that locality.

The Smith Engineering Works, Milwaukee, Wis., has added two new sizes to its line of Telsmith-Wheeling jaw crushers—a 10 in. by 21 in. and 24 in. by 36 in. These are both described in a new bulletin No. 264-D, recently issued by the company.

INCORPORATIONS AND CHARTERS

NICHOLSON MATERIAL CO. has engaged in the sand and gravel business at foot of Great Lakes Drive, Ecorse, Mich., with a capital of $50,000 common and $36,273 prior preferred.

SAN JOAQUIN SAND & GRAVEL CO. has been incorporated in San Joaquin County, Cal., with a capital of $10,000, by P. A. Hunt, J. L. East of Modesto, Cal. and A. L. Curtis of Stockton, Cal.

MANNING BROTHERS ROCK & SAND CO. has engaged in business in Irwindale, Cal., under management of D. E. Manning, 1836 S. Pine St., San Gabriel, Cal., and Dewey M. Manning, 100 East Los Higos, Alhambra, Cal.

GREEN BAY SAND & GRAVEL CO. has been chartered in Green Bay, Wis., by William Koehn, E. J. Robinson and L. R. Dilweg.

GOLD HILL LIME CO. has been established at Gold Hill, Ore., under management of R. A. Rolf.

SEATTLE CONCRETE PIPE CO. has been chartered in Seattle, Wash., with a capital of $40,000, by Harold Hutchinson, Talbot Campbell and A. E. Campbell.

THERMAL CITY SAND & GRAVEL CO. has been chartered in Asheville, N. C., with a capital stock of $50,000 by George A. Shuford, Jackson Bldg., and L. L. McCarry.

PEE DEE GRAVEL CO. has been chartered in Orangeburg, S. C., by W. W. Wannamaker, Jr., T. R. McMeckin, Jr., and others.

KEENER'S SAND & GRAVEL CO. has been incorporated in Hendrickson, Mo., with a capital of $10,000.

TUSKEGEE SAND & GRAVEL CO., Tuskegee, Ala. Paid in capital $20,000.

BAY CITY for stamina!

MODEL 20
FULL ¾ YD. CAPACITY
4 TON CRANE LOAD
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Helical cut gears—noiseless, long wearing.
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Chain crowd with automatic adjustment.
Fast operating speeds.
Safety worm boom hoist.
Separate hoist drums.
Full cab enclosing ALL machinery.

TYPES AND SIZES

Capacity	Model
⅝ yd.	20
⅝ yd. (Truck Shovel)	10
⅝ yd. (Tractor Shovel)	¾ Circle
½ yd.	30
⅝ yd.	38
¾ yd.	45
⅞ yd.	52
1 yd.	62
1¼ yd.	65

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BAY CITY, MICH.

MANUFACTURERS' LITERATURE

When We Say PORTABLE — We Mean PORTABLE! (Batching plants for truck mixers). 8 p. Heltzel Steel Form & Iron Co., Warren, O.

Pertinent Questions and Answers Concerning Dusts. 16 p. Mine Safety Appliances Co., Pittsburgh, Pa.

Hardinge Operating Data. 12 p. Hardinge Co., York, Pa.

The Arc Welding of Tomorrow. 20 p. Harnischfeger Corp., Milwaukee, Wis.

S-A Belt Conveyors and Bucket Elevators. 124 p. Stephens-Adamson Mfg. Co., Aurora, Ill.

Sullivan Shaft Hoists, 16 p. *Sullivan Stopers.* 4 p. Sullivan Machinery Co., Claremont, N. H.

Trukmixers, Agitators and Ready-Mixed Concrete Plants. 50 p. Blaw-Knox Co., Pittsburgh, Pa.

The Rorabeck Apron Feeder. 4 p. Link-Track Engineering Co., Chicago, Ill.

Protect Your Shipments the H-F Way. (car-lining paper) 4 p. Hummel-Foley Corp., Hopewell, Va.

Roto-Clone Water Spray Dynamic Precipitator. (Folder) American Air Filter Co., Inc., Louisville, Ky.

Around the World With Cletrac Crawler Tractors. 16 p. Cleveland Tractor Co., Cleveland, O.

Johns-Manville Insulation. 32 p. Johns-Manville Co., New York, N. Y.

Cedar Rapids Symons Vibrating Screens. 6 p. Iowa Mfg. Co., Cedar Rapids, Ia.

Sullivan Plus Portable Compressors, 24 p. Sullivan Machinery Co., Michigan City, Ind.

Manganal Welding Electrodes, 16 p. Stulz-Sickles Co., Newark, N. J.

The Vanderwerp Recuperator for Rotary Kilns, 6 p. Manitowoc Engineering Wks., Manitowoc, Wis.

No. 70 and No. 80 Portable Crushing and Screening Plants. 8 p. Austin-Western Road Machinery Co., Aurora, Ill.

Fairbanks-Morse Two-Stage Built-Together Pumps. 6 p. Fairbanks, Morse & Co., Chicago, Ill.

Akon Feed-Water Treatment. 16 p. Allis-Chalmers Mfg. Co., Milwaukee, Wis.

ECA Rebuilt Equipment . . . Stock List No. 144. 48 p. Equipment Corp. of America, Chicago, Ill.

REVIEWS OF RECENT BOOKS

PROPERTIES OF CEMENTS AND CONCRETES CONTAINING FLY ASH, *by R. E. Davis, R. W. Carlson, J. W. Kelly and H. E. Davis. Published by American Concrete Institute, Detroit, Mich. 36 p.*

Fly ashes from 15 sources and Portland cements of seven compositions were employed in the series of tests made by the authors to determine the effect of using fly ash as a replacement for Portland cement upon the properties of mortars and concretes. Properties investigated included strength, elasticity, volume change, durability, plastic flow, and heat of hydration. "Fly ash" is the residue from the burning of powdered coal.

The results of the investigation indicate that fly ashes of moderately low carbon content and moderately high fineness exhibit a high degree of puzzolanic activity as compared with most natural puzzolans. When such fly ashes are used in moderate percentages as a replacement for Portland cement, there can be produced concretes which exhibit qualities equal, and in some respects, superior to those exhibited by concretes containing corresponding Portland cement without fly ash.

As compared with concretes containing Portland cements, corresponding concretes containing properly constituted fly-ash cements exhibit (1) about the same water requirement to produce a given consistency; (2) somewhat lower compressive strength at the early ages but substantially higher compressive strength at the later ages under normal conditions of moist curing (70 deg. F.); (3) compressive strengths which are substantially higher even at the relatively early age of 28 days when the temperature of curing is 100 deg. F.; (4) shrinkage, for sections of normal thickness and normal drying conditions, which is likely to be no more and may be less: (5) lower heat of hydration; (6) about the same or somewhat less resistance to freezing and thawing; and (7) greater resistance to sulphate action.

In general, according to the authors, the performance of fly-ash cements appears to be most satisfactory when the Portland-cement constituent is of normal fineness and of normal or high-lime composition.

* * *

HOW TO DEAL WITH ORGANIZED LABOR, *by Alexander Feller and Jacob Hurwitz. Published by Alexander Publishing Co., Inc., 60 Wall St., New York, N. Y. 678 p. Price $6.50.*

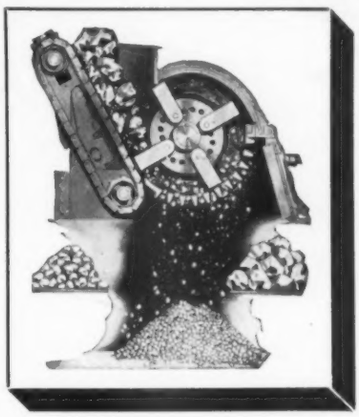
The history of labor disputes during the past few years has thrown into sharp relief the fact that few employers, faced with labor disputes, know what their rights are, what they can do, what they cannot do.

After frantic, and usually futile, attempts to achieve a quick peaceful settlement, they turn to their legal advisers—only to learn that they have already prejudiced their case and sacrificed some of their legal rights by making false moves in the early stages of negotiations.

This book is designed to enable employers to proceed in every step of their dealings with labor in such a way as to safeguard their interests from the time that negotiations commence until the final determination of the dispute.

Here one sees how to anticipate and avoid labor disputes wherever possible; how to retain independence of action before, during and after negotiations; how to arrive at the minimum settlement in the shortest possible time and with the least expense.

The book is wholly informative and practical—written by men who have first-hand knowledge of their subject. Both Mr. Feller and Mr. Hurwitz have had extensive practice in dealing with labor disputes, and between them have settled several hundred labor controversies within the past few years. In the present volume, they have analyzed and explained today's labor situation in such a light as to help employers to conduct their negotiations with labor intelligently, effectively and economically.



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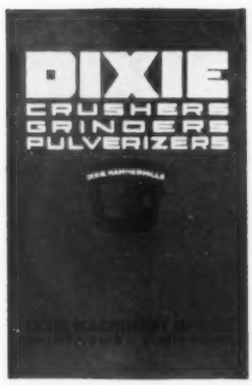

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BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

Although every effort is made to insure accuracy and completeness in these listings, the publisher cannot accept responsibility for errors or omissions. Any mistakes discovered will gladly be rectified

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*Warren Brothers Roads Co.

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*Eagle Iron Works
Pettibone-Mulliken Corp.

Agitators, Thickeners and Slurry Mixers
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Patterson Fdry. & Machine Co.
*Traylor Engr. & Mfg. Co.

Air Compressors (Portable)
*Chicago Pneumatic Tool Co.
*Fuller Company
*Ingersoll-Rand Co.

Air Compressors (Stationary)
*Chicago Pneumatic Tool Co.
*Ingersoll-Rand Co.

Air Conditioning
Jackson & Church Co.

Air Filters
*Blaw-Knox Co.
Dracco Corporation
*Parsons Engineering Corp.
*Western Precipitation Co.

Air Pumps
*Fuller Company
*Ingersoll-Rand Co.

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*Gruendler Crusher & Pulverizer Co.
*Hardinge Co.
Patterson Fdry. & Machine Co.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
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*Williams Patent Crusher & Pulverizer Co.

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Manganese Steel Forge Co.
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*Fuller Company.
*Hardinge Co.
Jackson & Church Co.
*Jeffrey Mfg. Co.
*Link Belt Co.
Patterson Fdry. & Machine Co.

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*Blaw-Knox Co.
*Fuller Company
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*Hardinge Co.
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*Traylor Engr. & Mfg. Co.

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*Robins Conveying Belt Co.
*Sprout, Waldron & Co.
*Wickwire-Spencer Steel Co.

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Multiplex Concrete Machinery Co.
R & L Concrete Machinery Co.

Blocks (Pillow)
*Jeffrey Mfg. Co.

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American Manganese Steel Co.
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*Sauerman Bros., Inc.
*Sprout, Waldron & Co.

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Bodies (Motor Truck, Concrete Mixing)
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*Blaw-Knox Co.
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Boots (Rubber)
Goodyear Tire & Rubber Co.

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Pennsylvania Drilling Co.

Brick Machines (Concrete)
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R & L Concrete Machinery Co.

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Jackson & Church Co.
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*Jaeger Machine Co.

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Bartlett & Snow Co., C. O.
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*Link-Belt Co.
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*Sauerman Bros., Inc.
Wellman Engr. Co.

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Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.
McLanahan and Stone Corp.
Pettibone-Mulliken Corp.
*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.

Buggies (Dump)
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*Sprout, Waldron & Co.

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*Jeffrey Mfg. Co.
*Link-Belt Co.

Carriers
Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.

Carryalls
Easton Car & Construction Co.
*Koehring Co.

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Jackson & Church Co.

Cars (Quarry and Gravel Pit)
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Castings
American Manganese Steel Co.
Bartlett & Snow Co., C. O.
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*Hardinge Co.
Hetherington & Berner, Inc.
Holmes & Bros., Inc., Robt.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
Patterson Fdry. & Machine Co.
Pettibone-Mulliken Corp.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.

Castings (Gray Iron)
Jackson & Church Co.

Cement Pumps (See Pumps; Air Pumps; Pumps, Cement Slurry; Pumps, Bulk Cement)

Central Concrete Mixing Plants (Comp.)
Bartlett & Snow Co., C. O.
*Jaeger Machine Co.
*Sprout, Waldron & Co.

Chain Attachments
*Jeffrey Mfg. Co.

Chain (Dredge and Shovel)
Manganese Steel Forge Co.

Chain Drives
*Jeffrey Mfg. Co.
*Link-Belt Co.

Chain (Elevating and Conveying)
American Manganese Steel Co.
Bartlett & Snow Co., C. O.
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.
*Sprout, Waldron & Co.

Chute Lining (Rubber)
Goodyear Tire & Rubber Co.

Chutes and Chute Liners
American Manganese Steel Co.
Bartlett & Snow Co., C. O.
Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.
McLanahan and Stone Corp.
Patterson Fdry. & Machine Co.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.

Classifiers
Bradley Pulverizer Co.
*Deister Machine Co.
*Hardinge Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
*Nordberg Mfg. Co.
Patterson Fdry. & Machine Co.
Simplicity Engr. Co.

Clips (Wire Rope)
*American Steel & Wire Co.
Bethlehem Steel Co.
*Leschen & Sons Rope Co., A.
*Roebling's Sons Co., John A.
*Wickwire-Spencer Steel Co.

Clutches
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Sprout, Waldron & Co.

Coal-Pulverizing Equipment
*Allis-Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.
Bradley Pulverizer Co.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Patterson Fdry. & Machine Co.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
*Traylor Engr. & Mfg. Co.
*Williams Patent Crusher & Pulverizer Co.

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Concrete Breakers (Air)
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*Ingersoll-Rand Co.

Concrete Mixers
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*Jaeger Machine Co.
*Koehring Co.

Concrete Slab-Raising Equipment (Mud-Jacks)
*Koehring Co.

Condensers
*Chicago Pneumatic Tool Co.
*Ingersoll-Rand Co.

Cones (Sand-Washing)
Bartlett & Snow Co., C. O.
*Chicago Bridge & Iron Co.
Iowa Mfg. Co.
*Link-Belt Co.
Smith Engr. Works

* See also information in the 1937 Pit and Quarry HANDBOOK.

Our Bulletin 105 contains exciting news for owners of small plants. Send for it!

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TY REDUCTION CRUSHER

Business men generally are "hard-boiled" — they've got to be to make a "go" of it, but crusher men are a little more so than others. So, when they unbend to voluntarily testify to the satisfaction derived from using a machine, as many of them have about our Type TY Reduction Crusher, be sure that machine must be good.

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THE HARDINGE CONICAL MILL gives you more balls per H.P., than any other type, which you can check by Taggart's Handbook, Table 12, Page 380. Inasmuch as balls do the grinding, this Mill will give you greater capacity per H.P. input.

In addition, it is built like a truss, which is the strongest construction, per unit of weight, yet devised. Consequently, dead weight is low, bearing friction reduced, and power saved, resulting in an increase in over-all efficiency.

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*Robins Conveying Belt Co.

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Bartlett & Snow Co., C. O.
Dracco Corporation
*Fuller Company
*Gruendler Crusher & Pulverizer Co.
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*Hendrick Mfg. Co.
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*Robins Conveying Belt Co.
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*American Pulverizer Co.
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*American Pulverizer Co.
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*Allis-Chalmers Mfg. Co.
Bacon, Inc., Earle C.
Bartlett & Snow Co., C. O.
*Gruendler Crusher & Pulverizer Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
New Holland Machine Co.
*Nordberg Mfg. Co.
Smith Engr. Works
*Traylor Engr. & Mfg. Co.

Crushers (Ring)
*American Pulverizer Co.
Bartlett & Snow Co., C. O.
*Williams Patent Crusher & Pulverizer Co.

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*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
Bartlett & Snow Co., C. O.
*Gruendler Crusher & Pulverizer Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
New Holland Machine Co.
Patterson Fdry. & Machine Co.
*Robins Conveying Belt Co.
*Williams Patent Crusher & Pulverizer Co.

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*Allis-Chalmers Mfg. Co.
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Bartlett & Snow Co., C. O.
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*Link-Belt Co.
McLanahan and Stone Corp.
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*Traylor Engr. & Mfg. Co
*Williams Patent Crusher & Pulverizer Co.

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*Bucyrus-Erie Co.
*Koehring Co.
Pettibone-Mulliken Corp.

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*Bucyrus-Erie Co.
*Link-Belt Co.
Page Engineering Co.
*Sauerman Bros., Inc.

Dragline Excavators
*Bay City Shovels, Inc.
*Bucyrus-Erie Co.
*Harnischfeger Corp.
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*Koehring Co.
*Link-Belt Co.
Northwest Engr. Co.
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*Bucyrus-Monighan Co.

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*Morris Machine Works

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Jackson & Church Co.

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*Chicago Pneumatic Tool Co.
*Ingersoll-Rand Co.

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*Chicago Pneumatic Tool Co.
*Ingersoll-Rand Co.
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Pennsylvania Drilling Co.

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*Chicago Pneumatic Tool Co.
*Ingersoll-Rand Co.

Drills (Core)
Hoffman Bros. Drilling Co.
*Ingersoll-Rand Co.
Pennsylvania Drilling Co.

Drills (Diamond)
*Chicago Pneumatic Tool Co.
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Hand-Hammer)
*Chicago Pneumatic Tool Co.
*Ingersoll-Rand Co.

Drills (Rock)
*Chicago Pneumatic Tool Co.
*Ingersoll-Rand Co.
*Jeffrey Mfg. Co.

Drill Steel
*Chicago Pneumatic Tool Co.
*Ingersoll-Rand Co.

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*Allis-Chalmers Mfg. Co.

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*Allis-Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.
*Hardinge Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdry. & Mch. Co.
McLanahan and Stone Corp.
Patterson Fdry. & Machine Co.
*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.

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Bartlett & Snow Co., C. O.
*Blaw-Knox Co.
Dracco Corporation
*Parsons Engineering Corp.
*Western Precipitation Corp.

Dust Collecting Systems
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
*Blaw-Knox Co.
Dracco Corporation
*Parsons Engineering Corp.
Patterson Fdry. & Machine Co.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
*Western Precipitation Corp.

Dust Conveying Systems
Allen-Sherman-Hoff Co.
Bartlett & Snow Co., C. O.
*Blaw-Knox Co.
Dracco Corporation
*Fuller Company
*Parsons Engineering Corp.
*Western Precipitation Corp

Dust Filters
*Parsons Engineering Corp.
*Western Precipitation Corp

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Allen-Sherman-Hoff Co.

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*Allis-Chalmers Mfg. Co.
*Fairbanks, Morse & Co.

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Stulz-Sickles Co.

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Engineers
*Allis-Chalmers Mfg. Co.
Bacon, Inc., Earle C.
Bradley Pulverizer Co.
*Fuller Company
Hetherington & Berner, Inc.
Holmes & Bros., Inc., Robt.
Iowa Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
McLanahan and Stone Corp.
Patterson Fdry. & Machine Co.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.
Sturtevant Mill Co.
*Traylor Engr. & Mfg. Co.

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Engines (Diesel)
Caterpillar Tractor Co.
*Chicago Pneumatic Tool Co.
*Cooper-Bessemer Corp.
*Fairbanks, Morse & Co.
*Ingersoll-Rand Co.
*Nordberg Mfg. Co.
Page Engineering Co.

Engines (Internal-Combustion)
Caterpillar Tractor Co.
*Chicago Pneumatic Tool Co.
*Cooper-Bessemer Corp.
*Fairbanks, Morse & Co.
*Ingersoll-Rand Co.
*Nordberg Mfg. Co.
Page Engineering Co.

Engines (Steam)
*Ingersoll-Rand Co.
*Morris Machine Works
*Nordberg Mfg. Co.

Excavating Machinery (See Shovels; Cranes; Buckets, etc.)

Excavators—Shallow Grading (Bucket Elevator Type)
Haiss Mfg. Co., Geo.

Fabricating (Electric Arc and Oxy-Acetylene)
Smith Co., S. Morgan
Stulz-Sickles Co.

Fans (Exhaust)
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

Feeders
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Bartlett & Snow Co., C. O.
Bradley Pulverizer Co.
*Fuller Company
*Hardinge Co.
*Huron Industries Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
Patterson Fdry. & Machine Co.
*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.
*Traylor Engr. & Mfg. Co.

Floor Sweeping Systems (Hydro Vacuum)
Allen-Sherman-Hoff Co.

Fuses (Detonating)
*Ensign-Bickford Co.

Gaskets
*Cincinnati Rubber Mfg. Co.
Goodyear Tire & Rubber Co.
Hewitt Rubber Corp.

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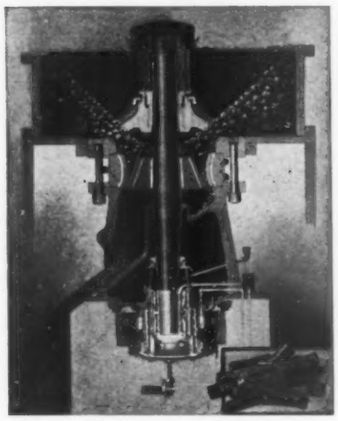
Gas Producers
Wellman Engr. Co.

Gates (Bin) (See Bin Gates)
Gates (Clamshell)
Haiss Mfg. Co., Geo.
*Link-Belt Co.

Gears (Herringbone)
Bartlett & Snow Co., C. O.

* See also information in the 1937 Pit and Quarry HANDBOOK.



GREATER TONNAGE with HALF THE POWER COST Guaranteed

THE Kennedy Ball Bearing Gearless Gyratory Crusher is guaranteed to produce a greater tonnage than any other crusher of a given size, with half the power per ton of ore. This crusher can be equipped with a synchronous motor in its pulley, or driven by flat or V-belt from a standard motor.

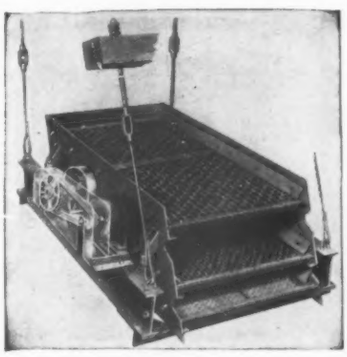
The Savings Effected with this crusher are astounding:

In cost of Maintenance 80%
In Power ..... The entire cost of crusher and motor in pulley is amortized annually.

Sieving test on glacial gravel crushed at the rate of 18 tons per hour, with No. 19 crusher set to ⅛ in., and using less than 25 hp., follows:

Minus ⅜ in.	100%
Plus 3 mesh	21½%
Minus 3—Plus 4	17%
Minus 4—Plus 14	36½%
Minus 14—Plus 48	15%
Minus 48—Plus 100	4%
Minus 100	5½%

KENNEDY VIBRATING SCREEN



Built in open or enclosed types, in widths ranging from 3′ to 6′ with one or more decks. It can be suspended, or supported from the bottom.

Suitable for scalping oversize from primary crushers, as well as smaller sizes, and chemical products.

The entire screening surface is effective, thereby insuring greatest capacity.

Equipped with self-aligning main bearings which account for low power consumption and also for long life of bearings.

Screen drive shaft is positioned near the feed end for balancing purposes and is patented.

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AMSCO

TRADE MARK REGISTERED

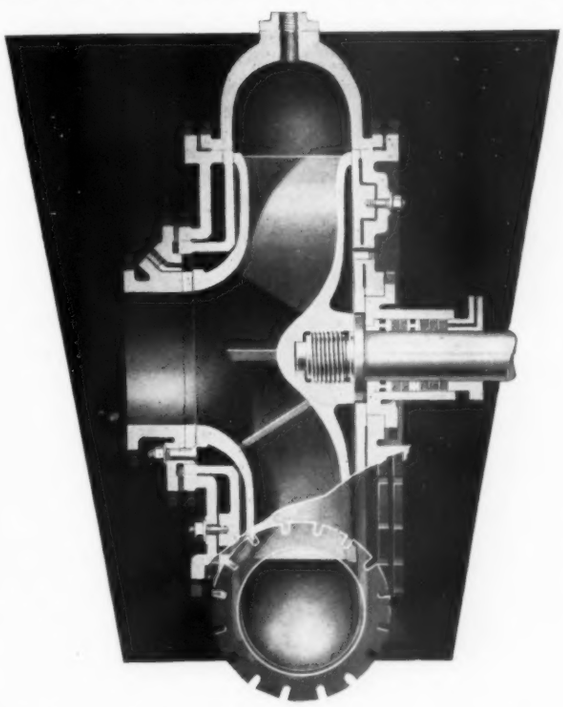
COUNTERFLOW DESIGN in PUMPS *New and Old!*

AMSCO "COUNTERFLOW" design is available in all sizes and types of new AMSCO Pumps and almost all types and sizes of AMSCO Pumps now in service can be readily converted, at nominal cost, to take full advantage of the savings that "COUNTERFLOW" design effects.

"COUNTERFLOW" design advantages include a wide funnel mouth impeller, threading of the impeller bore and shaft, minimized internal leakage; and greatly reduced internal wear which is accomplished by introducing clear water under pressure between the impeller shrouds and the shell side plates. The clear water, which is forced between the shrouds and plates with a counterflow action, excludes sand laden water, and definitely reduces wear.

Dredge and sand handling pumps of AMSCO "COUNTERFLOW" design have a greatly increased service life because of two outstanding features: internal wear is minimized, and AMSCO Manganese Steel, "the toughest steel known," affords complete impact and abrasion resistance.

Demand AMSCO "COUNTERFLOW" design in pumps new and old!



AMSCO service for sand and gravel producers is complete including the furnishing of pumps, flap valves, pipe fittings and dredge cutter heads, plus competent suggestions on design and construction of dredges, ladders, piping and other operating equipments.

Write for a copy of the new AMSCO Pump and Accessory Bulletin!

AMERICAN MANGANESE STEEL DIVISION

of The American Brake Shoe & Foundry Company

396 East 14th Street, Chicago Heights, Ill.

Foundries at Chicago Heights, Ill.; New Castle, Del.; Denver, Colo.; St. Louis, Mo.; Oakland, Calif.; Los Angeles, Calif.

Offices in Principal Cities

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A Directory of Pit and Quarry Advertisers Indexed According to Product.

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*Sprout, Waldron & Co.

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*Robins Conveying Belt Co.
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Smith Engr. Works
*Sprout, Waldron & Co.

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*Link-Belt Co.
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*Chicago Pneumatic Tool Co.
*Cincinnati Rubber Mfg. Co.
Goodyear Tire & Rubber Co.
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*Ingersoll-Rand Co.

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Bartlett & Snow Co., C. O.
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*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.

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*Allis-Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.
*Chicago Bridge & Iron Co.
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Patterson Fdry. & Machine Co.
*Traylor Engr. & Mfg. Co.

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*Chicago Bridge & Iron Co.
*Fuller Company
*Hardinge Co.
Iowa Mfg. Co.
Jackson & Church Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
*Robins Conveying Belt Co.

Lime and Hydrating Plants
*Chicago Bridge & Iron Co.
*Hardinge Co.
Traylor Engr. & Mfg. Co.

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Bartlett & Snow Co., C. O.
*Chicago Bridge & Iron Co.
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

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*Chicago Bridge & Iron Co.

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*Fuller Company
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*Jeffrey Mfg. Co.
*Link-Belt Co.
Patterson Fdry. & Machine Co.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.

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*Jeffrey Mfg. Co.

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*Jeffrey Mfg. Co.

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Manganese Steel Forge Co.
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American Manganese Steel Co.
Pettibone-Mulliken Corp.

Manganese Steel (Plates and Sheets)
American Manganese Steel Co.
Manganese Steel Forge Co.

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*Cincinnati Rubber Mfg. Co.
Goodyear Tire & Rubber Co.
Hewitt Rubber Corp.

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American Manganese Steel Co.
Bartlett & Snow Co., C. O.
Carnegie-Illinois Steel Corp.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Patterson Fdry. & Machine Co.
*Traylor Engr. & Mfg. Co.

Mills (Ball, Tube, etc.)
*Allis-Chalmers Mfg. Co.
*Hardinge Co.
Patterson Fdry. & Machine Co.
*Traylor Engr. & Mfg. Co.

Mills (Grinding) (See also Crushers—Hammer)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
Bartlett & Snow Co., C. O.
Bradley Pulverizer Co.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdy. & Mch. Co.
Patterson Fdry. & Machine Co.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
*Sprout, Waldron & Co.
*Traylor Engr. & Mfg. Co.
*Williams Patent Crusher & Pulverizer Co.

Mixers
Multiplex Concrete Machinery Co.

Motors and Generators
*Allis-Chalmers Mfg. Co.
*Fairbanks, Morse & Co.
*Harnischfeger Corp.

Motors (Internal-Combustion) (See Engines — Internal-Combustion)

Motor Trucks
General Motors Corp.

Moulds and Forms (Concrete)
Dunn Mfg. Co., W. E.
Multiplex Concrete Machinery Co.
R & L Concrete Machinery Co.

Nails
*American Steel & Wire Co.

Netting (Locomotive Stack)
*Tyler Co., W. S.

Nozzles (Gravel Washing)
*Deister Concentrator Co.

Nozzles (Hydraulic) (See Guns—Hydraulic)

Nozzles (Spray)
*Deister Concentrator Co.

Packings
*Cincinnati Rubber Mfg. Co.
Goodyear Tire & Rubber Co.
Hewitt Rubber Corp.

Pallets
Multiplex Concrete Machinery Co.

Pans—(Wet and Dry)
Jackson & Church Co.

Partitions (Wire)
National Wire Cloth Co.

Paving Mixers
*Jaeger Machine Co.
*Koehring Co.

Perforated Metal Plates
*Allis-Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.
Chicago Perforating Co.
*Hendrick Mfg. Co.
*Sprout, Waldron & Co.
*Wickwire Spencer Steel Co.

Pipe, Dredge (Floating and Shore)
*Chicago Bridge & Iron Co.
Naylor Pipe Co.
Taylor Forge & Pipe Works

Pipe Flanges
Hetherington & Berner, Inc.
Naylor Pipe Co.
Taylor Forge & Pipe Works

Pipe Forms (Concrete)
Quinn Wire & Iron Works
R & L Concrete Machinery Co.

Pipe Machines (Concrete)
Quinn Wire & Iron Works
R & L Concrete Machinery Co.

Pipe (Spiral)
Naylor Pipe Co.
Taylor Forge & Pipe Co.

Pipe (Welded)
Naylor Pipe Co.
Taylor Forge & Pipe Co.

Plants (Aggremeter) (See Aggremeter Plants)

Plug Valves (See Valves)

Pneumatic Conveying Systems (See Conveyors—Pneumatic)

Pneumatic Drills (See Drills, Rock)

Portable Conveyors
*Fuller Company
Haiss Mfg. Co., Geo.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Portable Crushing and Screening Plants
Bartlett & Snow Co., C. O.
*Gruendler Crusher & Pulverizer Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Williams Patent Crusher & Pulverizer Co.

Portable Engines (See Engines—Internal Combustion)

Portable Loaders (See Loaders and Unloaders)

Power Cables (Rubber Clad)
*American Steel & Wire Co.

Power Shovels (See Shovels, Electric, Internal-Combustion and Steam)

Power Tampers (Concrete)
Multiplex Concrete Machinery Co.

Precipitators
*Western Precipitation Corp.

Pre-formed Wire Rope
*American Cable Division of the American Chain & Cable Co.
Broderick & Bascom Rope Co.
*Leschen & Sons Rope Co., A.

Press Machines (Hand, Concrete)
Multiplex Concrete Machinery Co.

Presses (Brick and Block)
Jackson & Church Co.

Proportioning Equipment
*Blaw-Knox Co.
Jackson & Church Co.
*Jaeger Machine Co.

Pulleys
*Huron Industries Co.
Sprout, Waldron & Co.

Pulleys (Magnetic)
*Sprout, Waldron & Co.

Pulleys (Wing)
*Sprout, Waldron & Co.

Pulverized Fuel Systems
Bartlett & Snow Co., C. O.
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.

Pulverizers (See also Crushers, Mills, etc.)
*American Pulverizer Co.
Bartlett & Snow Co., C. O.
Bradley Pulverizer Co.
*Gruendler Crusher & Pulverizer Co.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
New Holland Machine Co.
Patterson Fdry. & Machine Co.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
Sturtevant Mill Co.
Traylor Engr. & Mfg. Co.
*Williams Patent Crusher & Pulverizer Co.

Pump Parts
Pettibone-Mulliken Corp.

Pump Valves (See Valves, Pump)

Pumps (Air-Lift)
*Chicago Pneumatic Tool Co.
*Fuller Company
*Ingersoll-Rand Co.

Pumps (Bulk Cement)
*Fuller Company

Pumps (Cement Slurry)
Allen-Sherman-Hoff Co.
*Morris Machine Works

Pumps (Centrifugal)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Erie Pump & Engine Works
*Fairbanks, Morse & Co.
Hetherington & Berner, Inc.
*Ingersoll-Rand Co.
*Jaeger Machine Co.
Kansas City Hay Press Co.
*Morris Machine Works
Pettibone-Mulliken Corp.

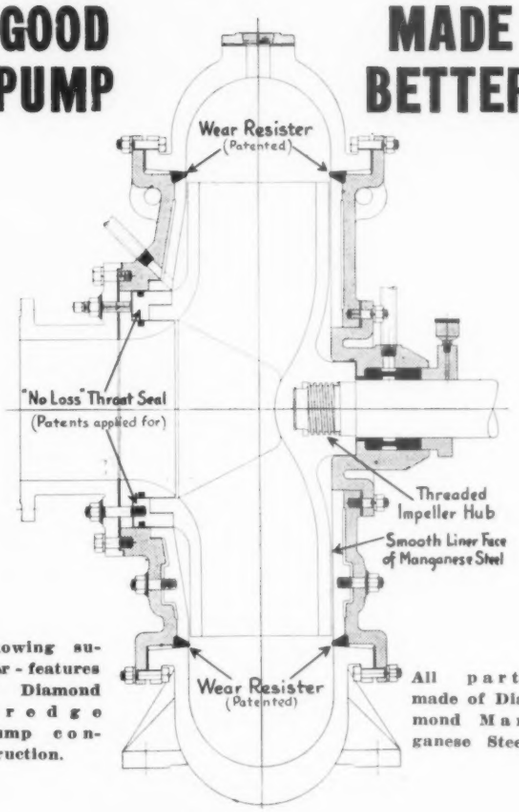
Pumps (Dredging)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
*Bucyrus-Erie Co.
Erie Pump & Engine Works
*Fairbanks, Morse & Co.
Hetherington & Berner, Inc.
Kansas City Hay Press Co.
*Morris Machine Works
Pettibone-Mulliken Corp.

Pumps (Sand and Gravel)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.

* See also information in the 1937 Pit and Quarry HANDBOOK.

DIAMOND

A GOOD PUMP NOW MADE BETTER



Showing super-features of Diamond Dredge Pump construction.

All parts made of Diamond Manganese Steel.

DIAMOND DREDGE PUMP

now give their users even better performance because of newly developed features. Operators can now produce material at a still lower cost. The patented "Wear Resister" protects pump shell, side plates and liners from wear at vital points. Threaded Impeller Hub or Bore gives greater impeller throat clearance and insures a true running impeller at all times. "No Loss" Throat Seal prevents internal leakage. P.M. Co. Products include Traveling Chain Cutter, Rotary Cutters, Elbows, Flap Valves, Nipples, Jaw Plates, Crusher Parts, Dippers, Dipper Teeth, Sheaves, and other Manganese Steel Products.

PETTIBONE MULLIKEN CORP.

4710 W. Division St. Chicago, Ill.

DEMPSTER

DUMPSTERS

SAVE-TIME↓

They increase profits by decreasing loading, hauling and dumping time.

Detachable buckets are spotted at points of loading and filled while previously filled buckets are being hauled to destination.

Loaded buckets are picked up after empty buckets are respotted. It is all very simple.

No heavy costly equipment to eat into profits—no delay — no high upkeep cost—no disappointments.

A hoisting device raises bucket to desired height — can be installed on your present trucks if desired or any other.

It's the modern, easy, speedy, economical and efficient way of hauling material more profitably. Low initial investment.

• WRITE FOR FACTS! •

DEMPSTER BROTHERS, INC.
KNOXVILLE TENN.

BUYERS' GUIDE

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Hetherington & Berner, Inc.
*Ingersoll-Rand Co.
Kansas City Hay Press Co.
*Morris Machine Works
Pettibone-Mulliken Corp.

Pumps (Slip)
Patterson Fdry. & Machine Co.

Pumps (Sump)
*Chicago Pneumatic Tool Co.
*Ingersoll-Rand Co.

Pumps (Vacuum)
*Chicago Pneumatic Tool Co.
*Fuller Company
*Ingersoll-Rand Co.

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Bartlett & Snow Co., C. O.
*Jaeger Machine Co.

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Rod Mills
*Hardinge Co.
Jackson & Church Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Patterson Fdry. & Machine Co.
*Traylor Engr. & Mfg. Co.

Rods (Welding)
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Stulz-Sickles Co.

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Sand and Gravel Handling Equipment
*Jeffrey Mfg. Co.
*Link-Belt Co.

Sand Separators
Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Link-Belt Co.
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Patterson Fdry. & Machine Co.
Simplicity Engr. Co.
Smith Engr. Works

Sand—Lime—Brick Machinery
*Hardinge Co.
Jackson & Church Co.

Sand-Settling Tanks
Bartlett & Snow Co., C. O.
*Chicago Bridge & Iron Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Nordberg Mfg. Co.
Smith Engr. Works

Scales
*Fairbanks, Morse & Co.
Merrick Scale Mfg. Co.

Scales (Track or Truck)
*Fairbanks, Morse & Co.
Merrick Scale Mfg. Co.

Scrapers (Power Drag)
Iowa Mfg. Co.
*Link-Belt Co.
*Sauerman Bros., Inc.

Screens
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Bacon, Inc., Earle C.
Bartlett & Snow Co., C. O.
Carnegie-Illinois Steel Corp.
Chicago Perforating Co.
Cleveland Wire Cloth & Mfg. Co.
*Deister Concentrator Co.
*Deister Machine Co.
*Eagle Iron Works
*Gruendler Crusher & Pulverizer Co.
Haiss Mfg. Co., Geo.
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*Hendrick Mfg. Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
Ludlow-Saylor Wire Co.
Manganese Steel Forge Co.
McLanahan and Stone Corp.
National Wire Cloth Co.
*Nordberg Mfg. Co.
*Robins Conveying Belt Co.
*Roebling's Sons Co., John A.
Simplicity Engr. Co.
Smith Engr. Works
*Sprout, Waldron & Co.
Sturtevant Mill Co.
*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.
*Wickwire-Spencer Steel Co.

Screens (Vibrating or Shaking)
*Allis-Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.
*Deister Concentrator Co.
*Deister Machine Co.
*Gruendler Crusher & Pulverizer Co.
*Huron Industries Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
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*Link-Belt Co.
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New Holland Machine Co.
*Nordberg Mfg. Co.
*Robins Conveying Belt Co.
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Smith Engr. Works
*Sprout, Waldron & Co.
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*Tyler Co., W. S.
*Williams Patent Crusher & Pulverizer Co.

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*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.

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*Huron Industries Co.

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Sheaves
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
*Eagle Iron Works
*Gruendler Crusher & Pulverizer Co.
Haiss Mfg. Co., Geo.
Hetherington & Berner, Inc.
*Link-Belt Co.
*Jeffrey Mfg. Co.
McLanahan and Stone Corp.
Pettibone-Mulliken Corp.
*Sprout, Waldron & Co.

Shovels (Electric, Internal-Combustion and Steam)
*Bay City Shovels, Inc.
*Bucyrus-Erie Co.
*Harnischfeger Corp.
*Koehring Co.
*Link-Belt Co.
Northwest Engr. Co.

Silos
*Chicago Bridge & Iron Co.

Skip Hoists and Skips
*Allis Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

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*Cincinnati Rubber Mfg. Co.

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*Huron Industries Co.
Iowa Mfg. Co.
*Link-Belt Co.

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Iowa Mfg. Co.
*Jeffrey Mfg. Co.
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*Sprout, Waldron & Co.

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*Jeffrey Mfg. Co.

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*Chicago Bridge & Iron Co.
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*Sprout, Waldron & Co.

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Owen Bucket Co.

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Bartlett & Snow Co., C. O.
*Chicago Bridge & Iron Co.
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Sauerman Bros., Inc.

Surfacers (Concrete)
*Ingersoll-Rand Co.

Sweeping Systems
Allen-Sherman-Hoff Co.

Tamp Machines (Hand, Concrete)
Multiplex Concrete Machinery Co.

Tanks
Bartlett & Snow Co., C. O.
*Chicago Bridge & Iron Co.
*Hendrick Mfg. Co.
Jackson & Church Co.
*Link-Belt Co.
Patterson Fdry. & Machine Co.
*Traylor Engr. & Mfg. Co.

Tanks (Elevated Steel)
*Chicago Bridge & Iron Co.

Tanks (Sand-Settling)
Bartlett & Snow Co., C. O.
*Chicago Bridge & Iron Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Patterson Fdry. & Machine Co.
Smith Engr. Works

Testing Sieves and Shakers
*Hendrick Mfg. Co.
*Tyler Co., W. S.

Thawing Equipment
Aeroil Burner Co.

Thickeners (Slurry)
*Hardinge Co.
Patterson Fdry. & Machine Co.

Tire Repair Materials
Goodyear Tire & Rubber Co.

Tools (Drill) (See Drilling Accessories)

Torches (Thawing)
Aeroil Burner Co.

Track Equipment
Pettibone-Mulliken Corp.

Track Shifters
*Nordberg Mfg. Co.

Tractors
*Allis-Chalmers Mfg. Co.
Caterpillar Tractor Co.

Trailers
General Motors Corp.

Trailers (Industrial)
Easton Car & Construction Co.
General Motors Corp.

Tramways (Aerial)
*American Steel & Wire Co.
Bethlehem Steel Co.
*Roebling's Sons Co., John A.

Transformers
*Allis-Chalmers Mfg. Co.

Transmission Belting (See Belting)

Transmission Machinery
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Bartlett & Snow Co., C. O.
*Gruendler Crusher & Pulverizer Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Trippers
Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Truck Cranes (See Cranes)

Truck Mixers
Bartlett & Snow Co., C. O.
*Blaw-Knox Co.
*Jaeger Machine Co.

Trucks (Hand)
Howe Scale Co.

Trucks and Trailers (See Motor Trucks)

Tube-Mills (See Mills—Ball, Tube, etc.)

Tubes (For Tire Casings)
Goodyear Tire & Rubber Co.

Turbines
Smith Co., S. Morgan

Turntables (Railway-Industrial)
Easton Car & Construction Co.

Underground Loaders
*Allis-Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.

Unloaders (Box Car)
Bartlett & Snow Co., C. O.
*Fuller Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Valves (Pump)
*Cincinnati Rubber Mfg. Co.
Taylor Forge & Pipe Works

Variable Speed Reducers or Transmissions
*Link-Belt Co.

Vibrating Screen Plate
Bartlett & Snow Co., C. O.
Chicago Perforating Co.
*Hendrick Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.

Vibrating Screens (See Screens—Vibrating)

Vibrators
*Ingersoll-Rand Co.
*Jeffrey Mfg. Co.
*Tyler Co., W. S.

Wagons (Dump)
Easton Car & Construction Co.
*Koehring Co.

Washers (Sand, Gravel and Stone)
*Allis-Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.
*Eagle Iron Works
Haiss Mfg. Co., Geo.
*Hardinge Co.
Iowa Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Mach. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Patterson Fdry. & Machine Co.
Smith Engr. Works
*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.

Weighing Equipment (Automatic)
*Blaw-Knox Co.
*Fuller Co.
*Jaeger Machine Co.
Merrick Scale Mfg. Co.

Welding Bars, Wedge and Applicator (Nickel - Manganese Steel)
Stulz-Sickles Co.

Welding and Cutting Equipment
Smith Company, S. Morgan
Stulz-Sickles Co.

Welding Rods
American Manganese Steel Co.
Bradley Pulverizer Co.
Stulz-Sickles Co.

Welding Service
Smith Co., S. Morgan
Stulz-Sickles Co.

Welding Supplies
American Manganese Steel Co.
*American Steel & Wire Co.
*Harnischfeger Corp.
Manganese Steel Forge Co.
*Roebling's Sons Co., John A.
Stulz-Sickles Co.
*Wickwire Spencer Steel Co.

Well Drills (See Drills—Well)

Wheels (Car)
American Manganese Steel Co.
*Eagle Iron Works
Iowa Mfg. Co.
Jackson & Church Co.
Pettibone -Mulliken Corp.

* See also information in the 1937 Pit and Quarry HANDBOOK.

Dust

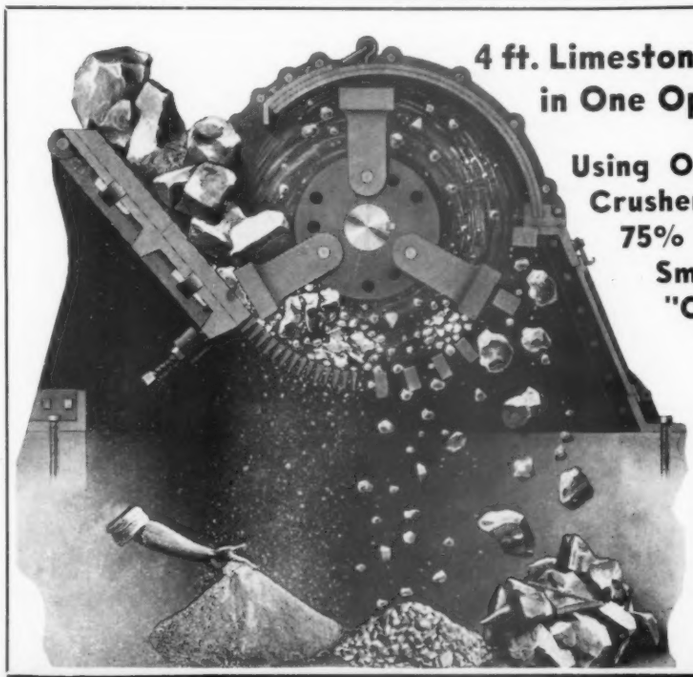
No two dust problems are alike. Every case requires special investigation covering the size, shape and density of the particles, the degree of concentration and the volume, temperature and characteristics of the gas. Western Precipitation Corporation makes such investigations with a background of more than thirty years of exclusive specialization on dust and fume control. It is prepared to recommend, design, build and install a system that exactly meets the conditions determined by investigation. Successful installations are operating on volumes ranging from a few hundred cubic feet per minute to several million cubic feet per minute, and in some cases collecting hundreds of tons of dust per day. Equipment for handling hot, cold, acid or alkaline gases is available for temperatures up to 1400° F. or higher, and efficiencies up to 99.99 percent.

Booklets on Cottrell Electrical Precipitators, Multiclones, Polyclones, Impax Separators and other equipment will be mailed free from obligation.

WESTERN PRECIPITATION CORPORATION
1016 West 9th St., Los Angeles, California • New York, New York
COTTRELL PRECIPITATORS . . . MULTICLONES . . . SPRAY DRYERS
PIONEER IN DUST AND FUME CONTROL

ALLIGATOR
TRADE MARK REG. U.S. PAT. OFFICE
STEEL BELT LACING

The smooth, durable hinged joint of Alligator Steel Belt Lacing is the most universally used of all belt lacings. Clinched teeth compress belt ends firmly, reducing destructive internal friction and ply separation. Twelve sizes in steel, "Monel Metal," and alloys for belts up to 5/8 in. Standard boxes, "Handy Packages," and long lengths.
Sold at wholesale and retail throughout the world.
Sole Manufacturers
FLEXIBLE STEEL LACING CO.
4623 Lexington Street, Chicago
In England at 135 Finsbury Pavement, London, E.C.2
REG. U. S. PAT. OFFICE



4 ft. Limestone to 1¼ inch in One Operation . .

Using One Williams Crusher Saves 50% to 75% in Investment
Smaller sizes Crush "One Man" Size Stone to 1¼-in., ¾-in., or Agstone

Cover of the No. 7 "Mammoth" crusher. Special attention is directed to the large hopper opening.

The Williams "Mammoth" Crusher is the modern and economical way to crush rock. It takes hard limestone as large as 4 feet and reduces to 1¼" in one operation, taking the place of a primary breaker and recrusher and eliminating the conveyors and elevators for carrying the rock from one crusher to another. Saving in first cost is 50% to 75% and crushing costs are obviously less because of fewer operations.

Williams Patent Crusher & Pulverizer Co.
802 St. Louis Ave., St. Louis, Mo.
Sales Agencies in All Principal Cities Including
Chicago 37 W. Van Buren | New York 15 Park Row | San Francisco 326 Rialto Bldg.

WILLIAMS PATENT CRUSHER & PULVERIZER CO. ST. LOUIS, MO. THE TRADE MARK REG. U.S. PAT. OFF.
Williams
OLDEST AND LARGEST BUILDERS OF HAMMERMILLS IN THE WORLD
PATENT CRUSHERS GRINDERS SHREDDERS

Hammer Crushers
Air Separators
Vibrating Screens
Impact Mills

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

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Winches and Capstans
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*Robins Conveying Belt Co.
*Sprout, Waldron & Co.

Wire and Cable (Electric)
*American Steel & Wire Co.
*Roebling's Sons Co., John A.

Wire Cloth
Cleveland Wire Cloth & Mfg. Co.
Ludlow-Saylor Wire Co.
Manganese Steel Forge Co.
National Wire Cloth Co.
*Robins Conveying Belt Co.
*Roebling's Sons Co., John A.
Tyler Co., W. S.
*Wickwire-Spencer Steel Co.

Wire Rope
*American Cable Division of the American Chain & Cable Co., Inc.
*American Steel & Wire Co.
Bethlehem Steel Co.
Broderick & Bascom Rope Co.
*Leschen & Sons Rope Co., A.
*Roebling's Sons Co., John A.
*Wickwire-Spencer Steel Co.

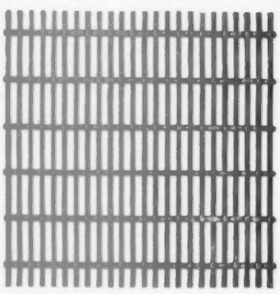
Wire Rope Fittings
*American Cable Division of the American Chain & Cable Co., Inc.
*American Steel & Wire Co.
Bethlehem Steel Co.
Broderick & Bascom Rope Co.
*Leschen & Sons Wire Rope Co., A.
Page Eng. Co.
*Roebling's Sons Co., John A.
*Wickwire-Spencer Steel Co.

Wire Rope Slings
*American Cable Division of the American Chain & Cable Co., Inc.
*American Steel & Wire Co.
Bethlehem Steel Co.
Broderick & Bascom Rope Co.
*Leschen & Sons Rope Co., A.
*Roebling's Sons Co., John A.
*Wickwire-Spencer Steel Co.

Wire (Welding)
American Manganese Steel Co.
*American Steel & Wire Co.
Manganese Steel Forge Co.
*Roebling's Sons Co., John A.
*Wickwire-Spencer Steel Co.

Worm Gears (See Gears and Pinions)

* See also information in the 1937 Pit and Quarry HANDBOOK.



Rolled Slot

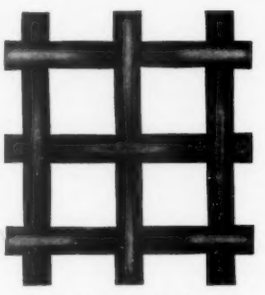
ALLOY No. 2

A super wearing Steel developed to resist the abrasion and vibration of modern screening demands.

"CLEVELAND" SCREENS

A wire cloth of guaranteed accuracy backed by fine workmanship and an effort to satisfy.

Available in Square Mesh and Rolled Slot. A trial will convince you of the superiority.



2 Mesh .162 Ga.

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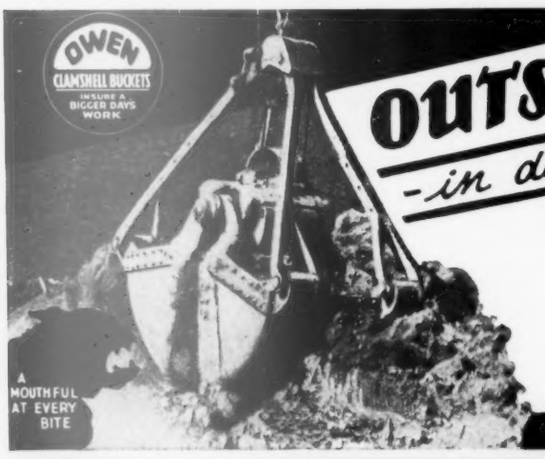

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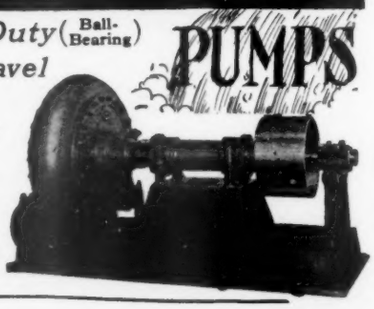

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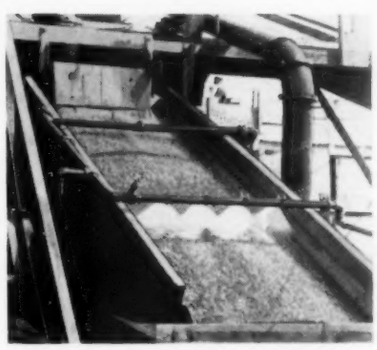

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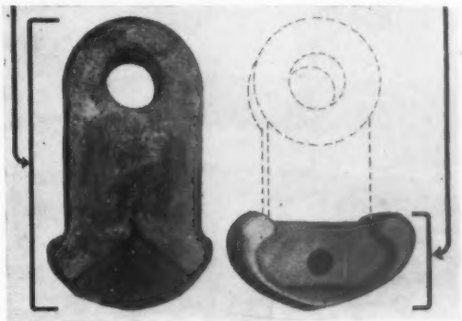

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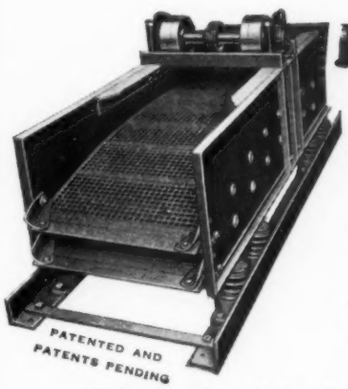

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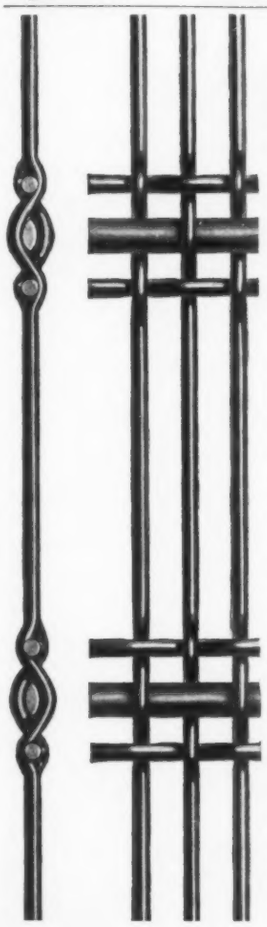

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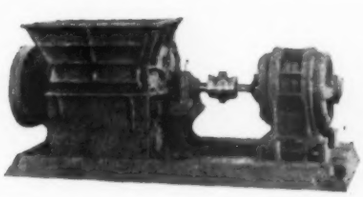

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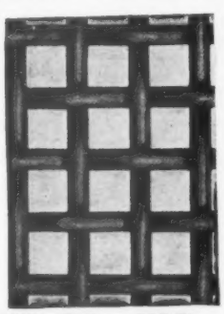

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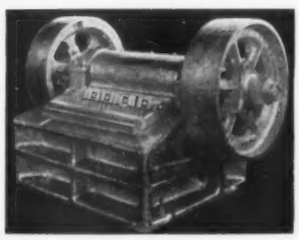

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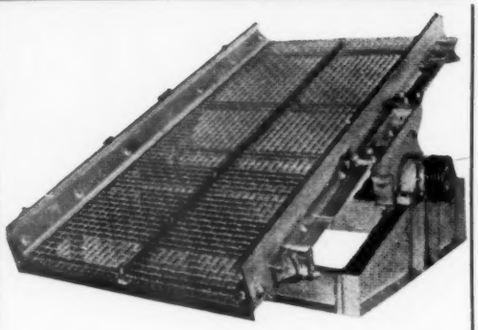

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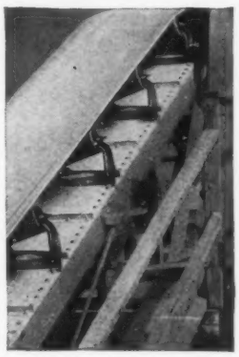

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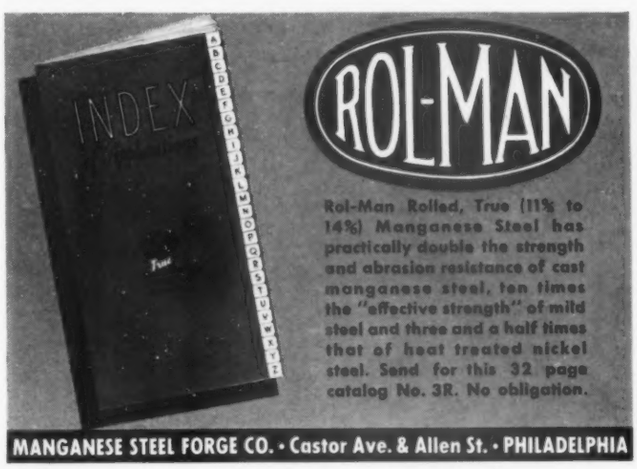

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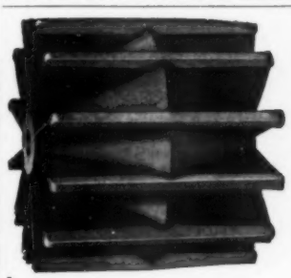

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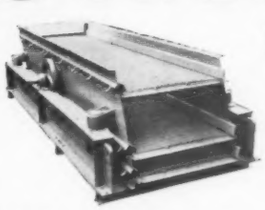

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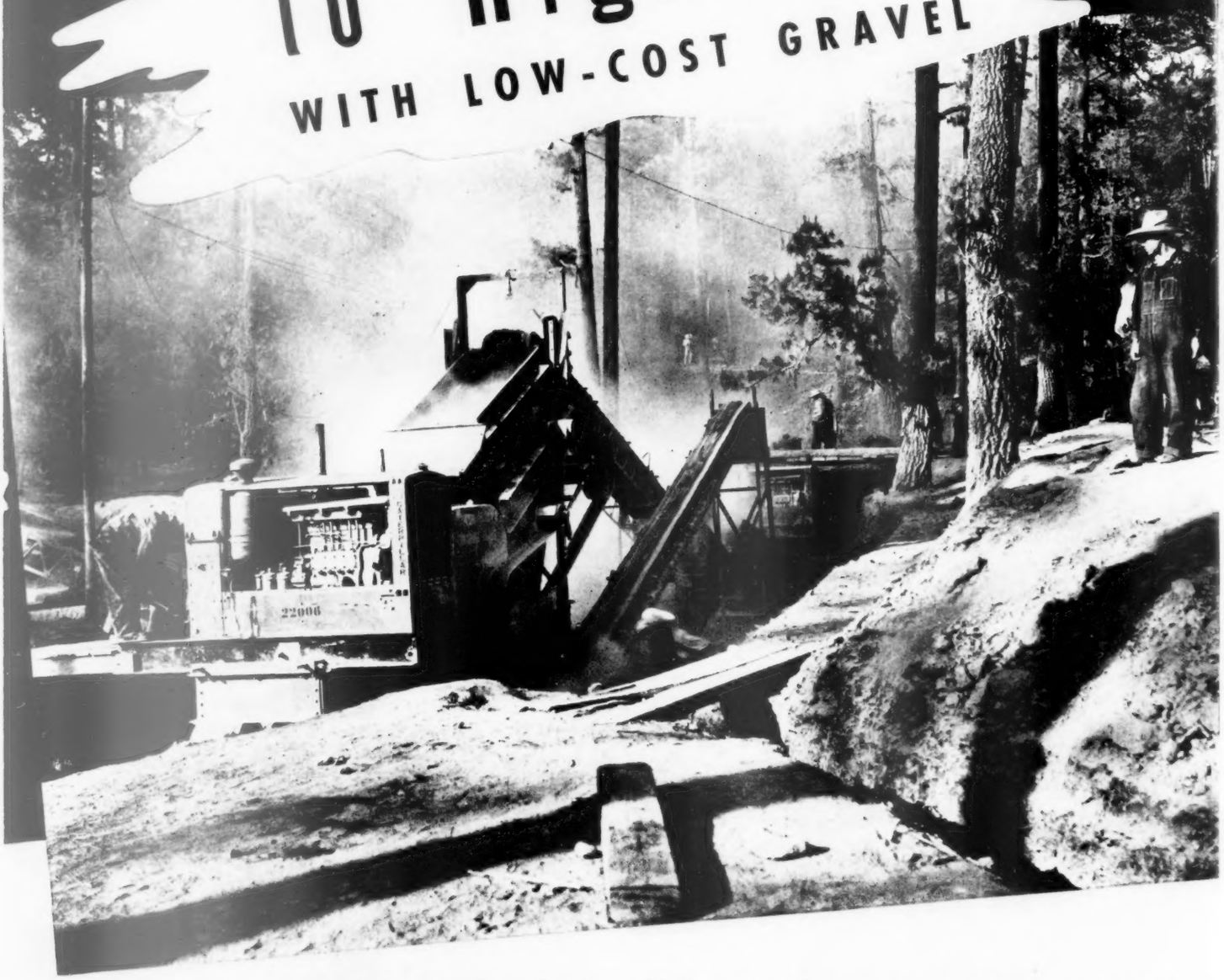

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